

The Spinturnicid Mites of Panama¹

(Acarina: Spinturnicidae)

DEANE P. FURMAN²

In recent years, particularly extensive collections have been made of ectoparasites from Central American mammals and birds. These have chiefly been obtained in the course of epidemiological investigations of arthropod-borne diseases that are transmissible to man, or as a prerequisite to such investigations, because knowledge of the systematics and biology of ectoparasites is basic to understanding potential pathogen-vector relationships.

The present report on the Spinturnicidae, mites which are exclusively parasitic on bats, deals with the Panamanian collections and, with few exceptions, those Trinidadian collections pertaining to new species that occur in both Panama and Trinidad. The rich Panamanian collections were made available to the author by Lt. Col. Vernon J. Tipton, then Chief, Environmental Health Branch, Preventive Medicine Division, United States Army, Caribbean. Concurrently, the author studied extensive collections of Trinidadian bat mites lent through the courtesy of Dr. Thomas H.G. Aitken of the Trinidad Regional Virus Laboratory of the Rockefeller Foundation at Port of Spain. Trinidad collections will be dealt with in a separate paper. All collecting localities mentioned in this paper are in Panama, unless otherwise stated.

The author acknowledges with appreciation the loan of collections by Lt. Col. Tipton and Dr. Aitken and staff of the Trinidad Regional Virus Laboratory. Gratitude is expressed to Dr. Marc André for making available a specimen of *Periglischrus caligus* identified by Kolenati, to E. P. Catts for inking the drawings and to the several graduate students in parasitology who helped with various phases of the work. To Mr. Arthur M. Greenhall

¹ This investigation was supported in part by Research Grant E-1509 from the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, Public Health Service.

² Department of Entomology and Parasitology, University of California, Berkeley.

and Dr. Charles O. Handley, grateful acknowledgment is expressed for aid in problems of bat identification, but the author accepts responsibility for accuracy of host names recorded here.

An excellent revision of the family Spinturnicidae was given by Rudnick (1960). The reader is referred to this publication for complete synonymical lists, for details characteristic of the family and for a key to the genera of Spinturnicidae.

Representatives of three genera from Panama are recorded here: *Periglischrus*, *Spinturnix*, and *Paraspinturnix*. All Panamanian species key out to the proper genus in Rudnick's (1960) key, except for a new species of *Periglischrus*, the male of which has peritremes, vestigial to apparently absent anterior to coxae III.

Genus *Periglischrus* Kolenati

Periglischrus Kolenati, 1857, Wien. Ent. Monatschr., 1, (2), p. 60. Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 195 (complete bibliographical synonymy).

Type-species: *Periglischrus caligus* Kolenati, 1857, by subsequent designation (Oudemans, 1903, Tijdschr. Ent., 45:135).

DIAGNOSIS (based on adults and modified from Rudnick, 1960): *Dorsum*.—Two dorsal plates closely approximated, occupying greater part of podosoma in female, and most of idiosoma of male; anterior plate much larger than posterior plate. Five pairs setae bordering anterior dorsal shield anterior to stigmata. One pair setae slightly posteromedial to stigmata. Peritreme completely dorsal, usually extending from level of coxa IV to level of coxa I.

Venter.—Lacking tritosternum. Female sternal plate with three pairs marginal setae which may be set off plate. Male sternal plate with five pairs setae. Epigynial plate reduced to narrow sclerotization with pair of small genital setae close to or on lateral margins of plate near posterior tip. Opisthosoma of non-teneral females usually greatly expanded to relatively flat, broad, fan-shaped appearance, with characteristically shaped areas of heavy sclerotization. Opisthosoma of male reduced, scarcely projecting posterior to level of coxae IV; six to eight pairs setae, exclusive of adanal pair, ventrally posterior to sternal plate. Anal plate in female small, subterminal, narrow, with pair adanal setae and dorsal postanal seta; anus terminal or dorsal. Male anal plate usually large, occupying much of area between coxae IV, with minute, dorsoterminal postanal seta.

Legs.—Large caruncles and claws on all legs. Dorsal and lateral setae short to long. Ventral setae usually short with exception of long, subterminal, tarsal trichobothria. Tarsus I of males with two long, bluntly tipped dorsal sensory setae located respectively at basal one-third and apical positions.

REMARKS: The previously known species of the genus *Periglischrus* were recorded only from bats of the family Phyllostomidae. The major part of the records of *Periglischrus* reported here are from the Phyllostomidae, but several collections are from the Desmodidae of the same superfamily and several are recorded from bats of the family Natalidae of the Vespertilionoidea. A single collection of several specimens is also recorded from a bat of the family Noctilionidae, superfamily Emballonuroidea.

Various instars of *Periglischrus* species commonly are encountered on their hosts. In common with other members of the family, species of this genus pass the larval stage of development in the body of the female. The first active stage seen is the protonymph which is characterized as follows: three pairs sternal setae; metasternal setae absent; four pairs dorsal propodosomal setae; peritreme short, extending barely, if at all, anterior to level

of posterior margin of coxa II. Female deutonymphs, as far as known, have a pair of metasternal setae, five pairs dorsal propodosomal setae and a long, dorsal peritreme extending to or near level of coxa I. Chelicerae as in adult female. Male deutonymphs resemble female deutonymphs but differ in having fewer setae ventrally between coxae IV, and these are arranged in the adult male pattern.

KEY TO THE SPECIES OF *PERIGLISCHRUS* OF THE WORLD

FEMALES

1. Peritreme of normal size over coxa III, narrow and thread-like from coxa III to I; from *Natalus mexicanus*..... *natali* n. sp.
Peritreme of normal size throughout.....2
2. Sternal plate about twice or more as wide as long; seven pairs of dorsal opisthosomal setae3
Sternal plate longer or approximately as long as wide; less than seven pairs of dorsal opisthosomal setae.....4
3. Sternal plate with broad, antero-median projection bearing first pair of setae; anterior end of adanal plate flanked by pair of shell-like sclerotized areas; four pairs strong, prominently plumose setae on unsclerotized venter in addition to normal setae; all legs with ventral broad, flat setae prominently fringed; common on *Pteronotus parnellii fuscus*.....*elongatus* n. sp.
Anterior margin of sternal plate slightly concave; adanal plate not flanked by shell-like sclerotizations; opisthosoma lacking prominently plumose setae ventrally; ventral leg setae of normal shape and at most narrowly fringed; from *Mormoops* spp. *strandtmanni* Tibbetts
4. Several pairs of ventral body setae with grossly expanded bases and acuminate tips; first and second pairs of dorsal propodosomal setae minute; from *Phyllostomus hastatus* *inflatseta* n. sp.
Ventral body setae simple, not with grossly expanded bases; first pair dorsal propodosomal setae may or may not be reduced; second pair not reduced.....5
5. Femur, patella and tibia of legs III and IV each with an inflated, straight, blade-like postero-ventral seta6
Femur, patella and tibia of legs III and IV lacking straight, blade-like postero-ventral setae; leg IV with three apically recurved postero-ventral setae.....7
6. First pair of dorsal propodosomal setae minute, usually embedded on margins of anterior dorsal plate; ratio of distance between first pair of propodosomal setae to that between first and second pairs less than 3:1; from numerous genera of phyllostomid hosts, particularly *Artibeus*..... *iheringi* Oudemans
First pair of dorsal propodosomal setae well developed, inserted on unarmed cuticula; ratio of distance between first pair of propodosomal setae to that between first and second pairs greater than 4:1; common hosts *Sturnira* spp. *aitkeni* n. sp.
7. Dorsal propodosomal setae relatively long, the longest measuring over 60 μ ; tibia and tarsus of legs I and II lacking inflated, recurved postero-ventral setae.....8
Dorsal propodosomal setae relatively short, the longest measuring not over 50 μ ; tibia and tarsus of leg I and patella and tibia of II each with an inflated, recurved, postero-ventral seta, superficially appearing blunt.....10
8. Femur II with only one of dorsal setae tiny; ratio of distance between first pair of propodosomal setae to that between first and second pairs greater than 4:1; common on *Desmodus*..... *desmodi* n. sp.
Femur II with two of dorsal setae tiny; ratio of distance between first pair of propodosomal setae to that between first and second pairs less than 3:1.....9
9. Palpal tibia with strong medio-distal lobe; leg IV with large, broadly inflated scimitar-like postero-ventral setae; dorsal opisthosoma bearing four small setae; from *Glossophaga soricina*..... *caligus* Kolenati

- Palpal tibia lacking medio-distal lobe; leg IV with elongate, setaceous, curved postero-ventral setae; dorsal opisthosoma bearing six medium to large setae; hosts: *Anoura*, *Lonchoglossa*, *Trachops*.....*vargasi* Hoffmann
10. Sternal plate broadly jug-shaped with short, narrow neck; anterior dorsal plate longer than broad (320 μ by 281 μ); coxa III with relatively large posterior seta; anterior legs, exclusive of ambulacrum, over 500 μ long; hosts: common on *Phyllostomus*, *Trachops*.....*tiptoni* n. sp.
- Sternal plate narrowly pear-shaped with eroded margins and a long neck; anterior dorsal plate about as broad as long measured on the mid-line (243 μ); coxa III with very small posterior seta; anterior legs, exclusive of ambulacrum, less than 400 μ long; common on *Micronycteris*.....*micronycteridis* n. sp.

MALES

1. Peritreme constricted and thread-like anterior to mid-level of coxa III...*natali* n. sp.
Peritreme of normal size throughout.....2
2. Unarmed ventral cuticula of idiosoma with numerous minute, thornlike mammillations.....3
Unarmed ventral cuticula of idiosoma lacking such mammillations.....4
3. Coxa II with two long, subequal setae; distal seta of coxa I simple, setiform.....*elongatus* n. sp.
Coxa II with posterior seta much larger than anterior seta; distal seta of coxa I expanded, blade-like.....*strandtmanni* Tibbetts
4. Legs I and II with several blunt, fusiform setae; some ventral setae between coxae IV inflated.....*inflatseta* n. sp.
Not as above.....5
5. Sternal plate setae short; anterior pair extending about one-half distance to level of second pair.....6
Sternal plate setae relatively long; anterior pair extending about four-fifths or more of distance to level of second pair.....7
6. A small mite with idiosoma less than 400 μ long; posterior seta of coxa II about 50 μ long; dorsal propodosomal setae short, not over 45 μ long...*caligus* Kolenati
Idiosoma over 500 μ long; posterior seta of coxa II about 130 μ long; longest dorsal propodosomal setae over 65 μ long.....*vargasi* Hoffmann
7. Tarsi III and IV with coarsely barbed dorsal setae; ratio of length of posterior seta to that of anterior seta of coxa II less than 2:1.....*tiptoni* n. sp.
Tarsi III and IV superficially nude; ratio of length of posterior seta to that of anterior seta of coxa II over 2:1.....8
8. Anterior dorsal propodosomal setae relatively close together; ratio of distance between bases of first pair of setae to that between bases of first and second pairs about 2:1.....*iheringi* Oudemans
Ratio of distance between bases of first pair of setae to that between bases of first and second pairs about, or more than 4:1.....9
9. Three pairs setae on unarmed dorsal opisthosoma; ventral pair setae behind sternal plate about three-fourths length of posterior setae of sternal plate...*desmodi* n. sp.
One pair setae on unarmed dorsal opisthosoma; ventral pair setae behind sternal plate minute.....10
10. Relatively large mite with anterior legs, exclusive of ambulacra, over 500 μ long; spermatophoral process less than 100 μ long, shaped as a shepherd's crook.....*aitkeni* n. sp.
Relatively small mite, anterior legs about 400 μ long exclusive of ambulacra; spermatophoral process over 150 μ long, extensively recurved.*micronycteridis* n. sp.

Periglischrus natali, new species. Plate 37.

Both sexes of this mite differ from other known species of the genus in the sharp constriction of the peritremes to a thread-like appearance anterior to the level of coxae III.

DESCRIPTION, FEMALE (pl. 37, figs. 1, 2): A small mite for the genus, broadly rounded anteriorly and posteriorly and with lateral margins constricted at level of anterior opisthosoma. Idiosoma 486–540 μ long by 280–380 μ wide. Legs short, stout.

Dorsum.—Overall outline of two dorsal plates ovate. Plates separated only by lateral invaginations opposite stigmata, extending inward one-fourth width of plate, and by a suture in mid-region. Anterior plate 209 μ long on mid-line by 209 μ wide; slightly angulate shoulders at level of second pair propodosomal setae; with 10 pairs distinct alveoli. Posterior plate 92 μ long on mid-line by 148 μ wide; with nine pairs alveoli; pair minute setae in posterior pair alveoli. Anterior pair propodosomal setae 25 μ long, others progressively smaller proceeding posteriorly; ratio of distance between bases of first pair propodosomal setae to that between first and second pairs 0.7:1. Peritremes of normal length for genus but abruptly constricted and thread-like from mid-level of coxae III to level of anterior margins of coxae II, of normal width at anterior tip and posteriorly. Unarmed opisthosoma with six pairs minute setae. Posterior tip of anal plate extending dorsally, with minute postanal seta dorsal.

Venter.—Sternal plate broadly jug-shaped with short, anterior, "neck" ending bluntly; 101 μ long by 91 μ wide; three pairs fine short (7 μ) setae just off plate; two pairs pores on plate. Pair metasternal setae subequal to sternals, located postero-lateral to plate. Epigynial plate small, fan-shaped anteriorly, constricted centrally and slightly expanded at posterior tip; pair genital setae subequal to sternals, inserted off plate opposite constriction. Pattern of opisthosomal sclerotized areas basically as in *Periglyphichrus tiptoni*, but not visible in some specimens. Opisthosomal setae minute, slightly longer posteriorly; 11 pairs excluding adanal pair; adanal pair longer, 18 μ , and set anterior to anal opening on subterminal, pyriform anal plate.

Legs.—Short, stout; leg I 286 μ long exclusive of ambulacrum. All coxal setae delicate, minute except for posterior one of coxa II which is strong and about 73 μ long. Setae of other leg segments relatively small for the genus, otherwise not strikingly modified. Numbers of minute dorsal setae on femora I to IV respectively are 0, 1, 2, 2. Posterior margin of femur, patella and tibia IV each with quite long, narrow, sickle-shaped seta.

Gnathosoma.—Inner and outer hypostomal setae absent; distal hypostomal and gnathosomal setae subequal, simple, about 11 μ long. Palpal tibia with slight medio-distal lobe.

MALE (pl. 37, figs. 3, 4): A relatively small, elliptical to ovoid mite with setation less robust than is typical of the genus. Idiosoma 324 μ long by 243 μ wide.

Dorsum.—Dorsal plates similar to those of female but fusion of anterior and posterior plates more complete; combined plates cover all but narrow lateral margins of idiosoma; anterior plate 211 μ long on mid-line by 178 μ wide; posterior plate 86 μ long by 119 μ wide. Propodosomal setae relatively short, anterior two pairs about 24 μ long, others slightly shorter; ratio of distance between bases of first pair to that between bases of first and second pairs about 0.55:1. Unarmed opisthosoma bearing one pair of small setae postero-laterally in addition to subequal postanal seta terminally. Peritreme more reduced than in female, only the posterior extremity to the mid-level of coxa III of normal width; constricted portion reduced to vestigial state and all but invisible even in stained specimens.

Venter.—Sternal plate longer than wide, modified cordate with relatively long antero-medial projection and prominent antero-lateral shoulders; four pairs marginal and one pair submedian well developed, acicular setae; posterior pairs noticeably shorter than anterior pair. Two pairs pores on plate. Pair of small setae just behind sternal plate about one-third size of posterior sternal setae. Anal plate longer than broad with irregular margins, extending from mid-level of coxae IV to posterior body margin, widest at mid-level. Acicular setae on and around anal plate slightly smaller than posterior sternal setae; one pair anterior to anal plate, one at level of anterior one-fifth of plate and one pair opposite constriction of posterior one-third of plate; three pairs setae on plate anterior to adanal pair of setae; latter smaller than other setae and situated just anterior to anus. Anus terminal. Pair small adanal platelets flanking postero-lateral margins of anal plate appearing typically as sinuous, longitudinally oriented bars.

Legs.—Leg I of allotype 297 μ long exclusive of ambulacrum. Proximal seta of coxa I and anterior seta of coxa III very small, others relatively long; posterior seta of coxa II longest, 56 μ , over twice as long as next longest coxal seta. Ventral leg setae small, acicular. Dorsal leg setae acicular, nude or very minutely and sparsely barbed; few long setae, majority small to minute; one minute seta each on femora II, III and IV, none on femur I.

Gnathosoma.—Pair gnathosomal setae 12 μ long, slightly longer than distal hypostomal pair. Inner and outer hypostomal setae absent. Hypostomal processes elongate with membranous expansion. Usual pair of blunt, sinuous setae on tip of tibia very strongly developed. Chelicerae normal, each with spermatophoral process tubular, recurved, about 96 μ long. Tectum a simple lobe with narrowly rounded apex and broad base with slight proximal constriction.

MALE DEUTONYMPH: Characteristic of the genus except that peritreme is abruptly constricted over anterior one-third of coxa III and continued anteriorly as thread-like, sinuous, dorsal line to posterior level of coxa I.

TYPE MATERIAL: Holotype female and allotype male, together with 2 female, 2 male and 1 deutonymphal paratypes (host no. 6729) collected by C. M. Keenan and V. J. Tipton from *Natalus stramineus mexicanus* at San Lorenzo Caves, Fort Sherman (Canal Zone), 15 March 1961. Five paratypes including 3 females, 1 male and 1 protonymph with same collection data as type but taken as a separate collection. Holotype, allotype and 2 paratypes in the United States National Museum; 2 paratypes, male and female, Chicago Natural History Museum; 1 male paratype, Trinidad Regional Virus Laboratory; remaining paratypes in collection of author.

ADDITIONAL MATERIAL EXAMINED: 1 female, same data as the type, and 4 males from *Natalus tumidirostris haymani*, Mount Tamana Caves, Trinidad, by T. H. G. Aitken, 20 November 1957.

REMARKS: This is the only spinturnicid collected from bats of the genus *Natalus*. Goodwin and Greenhall (1961) recorded *Natalus tumidirostris haymani* in Trinidad roosting in caves in association with several other species of bats, which are recorded in the present paper as hosts of five other distinct species of *Periglischrus*. In view of the apparent opportunity for transfer of mites from host to host under such conditions, failure to find any evidence of such transfer indicates a rather strict host specificity of *P. natali* to bats of the genus *Natalus*.

***Periglischrus elongatus*, new species. Plate 38.**

Females of *Periglischrus elongatus* are characterized by a sternal plate which is broader than long and with the first pair of setae on a broad anterior projection of the plate; the legs bear numerous ventral, prominent, flattened, bipectinate setae. Both sexes, in common with *Periglischrus strandtmanni*, have numerous minute, ventral, thorn-like mammillations. Males differ from the latter species in having a long, typically setiform, distal seta on coxa I and in having two long, subequal setae on coxa II.

DESCRIPTION, FEMALE (pl. 38, figs. 1, 2): An elongate mite with relatively short, stout legs. Idiosoma 1000 μ long by 405 μ wide at level of coxae IV.

Dorsum.—Plates relatively small; larger anterior one 250 μ long by 232 μ wide, without pronounced shoulders of *Periglischrus strandtmanni*; with 11 pairs circular alveoli, at least two pairs with minute setae. Small posterior plate 69 μ long by 110 μ wide, with seven pairs alveoli, posterior pair bearing minute setae. First pair propodosomal setae

about one-half length of remaining four pairs which measure up to 55μ long; ratio of distance between bases of first pair to that between first and second pairs 1.8:1. Opisthosoma with seven pairs well developed setae. Peritreme normal. Anal opening dorsal, subterminal; sclerotized rim of anus subcircular; postanal sclerotization anterior to anus in form of inverted U with slightly serrated inner rim; minute postanal seta centered on inner rim of postanal sclerotization.

Venter.—Sternal plate shorter than broad, 61μ long on mid-line by 128μ wide, with broad anteromedian projection bearing first pair setae; posterior margin slightly concave in middle; three pairs sternal setae subequal, approximately 28μ long; second and third pairs located on posterior margin of plate; two pairs rounded pores on plate. Pair metasternal setae about one-half length of sternal setae, located midway between sternal and epigynial plates. Genital opening a small transverse slit in mid-line at level of posterior margins of coxae III. Epigynial plate a narrow longitudinal strip 67μ long by 9μ wide bearing two prominent, lightly pilose, long setae, 61μ long, on posterior margin. Adanal pair setae similar to genital setae but somewhat shorter, arising from posterior margin of ventral platelet which is a narrow, elongate bar, slightly enlarged posteriorly and widely separated from dorsally situated anus; anterior end of platelet in a cavity bordered by two lateral shell-like sclerotized areas. Opisthosomal cuticula minutely striated, bearing nine pairs setae; pair larger setae anterior to adanal setae and two pairs on postero-lateral margins prominently bipectinate; other setae smaller and most arising from cup-shaped alveoli as illustrated. Podosomal cuticula in region of sternal plate furnished with numerous minute, thorn-like mammillations.

Legs.—Relatively short and stout; legs I 383μ long exclusive of ambulacrum; posterior seta of coxa II modified to appearance reminiscent of palmate hairs of *Anopheles* mosquito larvae, with enlarged, flattened basal section gradually tapering toward apex and bipectinate throughout; distal seta coxa I slightly shorter than posterior seta of II, typically setiform, sparsely and minutely barbed; anterior setae of II and III similar but smaller; other coxal setae simple, short. Coxa II with antero-dorsal marginal spur and coxa III with posterior marginal spur. Prominent palmate setae similar to that of coxa II present on ventral side of most other leg segments distal to coxae, in addition to unmodified setae, several of which are slightly pectinate. Dorsal setae well developed, simple; long setae very minutely and sparsely barbed; no minute setae on femora.

Gnathosoma.—Pair distal hypostomal setae 16μ long, somewhat longer than gnathosomal pair. Inner hypostomal setae absent; outer hypostomal pair represented only by pair of small alveoli. Palpi unmodified except for sclerotized ventro-medial, bidentate to tridentate flange on each trochanter, flanking mouthparts. Chelicerae normal.

MALE (pl. 38, figs. 3–5): A relatively long-legged mite with ovoid body 350μ long by 285μ wide in allotype. Other specimens up to 430μ long.

Dorsum.—Dorsal plates closely approximated and covering all but narrow margin of idiosoma. Anterior plate 226μ long by 235μ wide, with narrowly rounded anterior margin, moderate shoulders over coxae I and widest at level between coxae II–III; posterior margin truncate and angularly concave; surface with 12 pairs alveoli. Posterior plate 75μ long by 104μ wide; subtriangular; surface with seven pairs alveoli, posterior pair bearing minute setae. Proposomal setae all of moderate length, up to 34μ long; ratio of distance between bases of first pair to that between first and second pairs 1.7–2.4:1 based on four specimens. Peritremes normal for genus except that they bend laterad markedly between coxae II and III and dip to ventral surface at this point on some specimens. Unarmed opisthosoma lacking setae.

Venter.—Sternal plate broadly flask-shaped with long anterior neck, 151μ long on mid-line by 140μ wide at level of second pair setae; with four pairs marginal and one pair post-centrally located setae; anterior pair 33μ long, others subequal or slightly shorter; surface with pattern of transverse lines. Pair submedial setae posterior to sternal plate three-fourths length of posterior sternal setae. Five pairs simple setae, subequal to posterior sternals, located between coxae IV on unarmed cuticula; adanal setae stouter and longer and located on small anal plate just anterior to terminal anus; anal plate small with ill-defined margins. Postanal seta minute and dorsal. Ventral cuticula of idiosoma furnished with minute thorn-like mammillations as illustrated.

Legs.—Relatively long; leg I 470 μ long exclusive of ambulacrum. Coxal setae simple, well developed; anterior and posterior setae of coxae II subequal, other segments ventrally with setae normal, relatively short. Coxa II with antero-dorsal marginal spur and coxa III with posterior marginal spur. Dorsal setation normal for genus with all setae essentially nude.

Gnathosoma.—Gnathosomal and distal hypostomal setae simple, small, subequal. Outer hypostomal setae vestigial, set in relatively prominent alveoli. Inner hypostomal setae absent. Hypostomal processes long, elliptical, each with membranous, blade-like expansion. Palpi relatively long, thin. Chelicerae each with short, recurved spermatophoral process about 55 μ long.

FEMALE DEUTONYMPH: Idiosoma shape similar to that of male, 432 μ long by 356 μ wide, but legs relatively stout in relation to length; leg I 443 μ long exclusive of ambulacrum. Peritreme extending only to level of posterior one-fifth of coxa II, posterolaterad of dorsal propodosomal seta IV. Dorsal plates as in male. Venter with angulate mammillations as in male. Sternal plate subcircular with anterior margin slightly projected; surface with transverse lines; three pairs setae on plate. Two pairs setae in space between sternal plate and level of anterior margin of coxae IV. Unarmed cuticula between coxae IV and anterior to anal plate with seven pairs simple setae. Three pairs minute peg-like setae lateral to anal plate. Anal plate ovate, broader posteriorly, terminal, with pair well developed adanal setae.

MALE DEUTONYMPH: Idiosomal shape as in female deutonymph but legs not as stout in relation to length. Dorsum as in female deutonymph; typical specimen appears to have narrower margin of body unprotected by dorsal plates. Sternal plate with antero-medial lobe more pronounced than in female deutonymph; three pairs setae on plate and three pairs immediately posterior to it. Unarmed cuticula between coxae IV and anterior to anal plate with five pairs simple setae; lacking three pairs peg-like setae lateral to anal plate. Angulate mammillations and other ventral features as in female deutonymph.

PROTONYMPH: A broadly elliptical mite with short, stout legs bearing rather delicate setae. Idiosoma 395 μ long by 319 μ wide. Leg I 405 μ long exclusive of ambulacrum. Dorsal plates as in male. Only four pairs propodosomal setae similar in size to those of male. Peritreme dorsal, extending anteriorly only to space between coxae II and III, ending on lateral margin of body or even ventro-laterally. Sternal plate margins indistinct, with three pairs well developed, simple setae and two pairs pores; surface transversely sculptured. Ventral area between coxae IV and anterior to anal plate with four pairs simple setae. Leg setae simple, nude. Gnathosomal and distal hypostomal setae relatively longer than in male. Outer hypostomal setae small but distinct, much larger than in male.

TYPE MATERIAL: Holotype female (colln. no. T275) together with paratype female collected by W. G. Downs from "*Chilonycteris rubiginosa fusca*" at Mt. Tamana Caves, Trinidad, 12 June 1956. Allotype male and one paratype male (colln. no. T269) with same collection data as type. Other paratypes include 2 protonymphs with same data as type; 13 males, 1 female deutonymph and 1 protonymph from same host and locality taken by T. H. G. Aitken, 20 November 1957; 2 males from same host at Heights of Guanapo, Trinidad, by T. H. G. Aitken, 19 May 1957, and 1 female, 5 males and 3 protonymphs with same data but collected 1 October 1957; 6 females, 31 males, 3 female deutonymphs, 4 male deutonymphs and 8 protonymphs from same host species taken at Paraíso (Canal Zone), by C. M. Keenan and V. J. Tipton, 24 July 1959.

Holotype, allotype and 9 paratypes, including 4 males, 1 female, 2 protonymphs and 2 deutonymphs (male and female), in the United States National Museum; 8 paratypes, including all stages, Chicago Natural History

Museum; 4 paratypes (males and females), Trinidad Regional Virus Laboratory; remaining material in the collection of the author.

ADDITIONAL MATERIAL EXAMINED: From *Pteronotus parnellii fuscus*: Paraíso (Canal Zone), 16 September 1959; Madden Air Field (Canal Zone), 23 May and 3 October 1961; Chilibrillo Caves (Panamá), 2 August 1960; Bocas del Toro Province, 1 February 1960; Cerro Hoya (Los Santos), 18 February 1962. From *Pteronotus suapurensis*, a single collection of 3 males, Chilibrillo Caves (Panamá), collected by C. M. Keenan and V. J. Tipton, 8 March 1960.

REMARKS: *Periglischrus elongatus* is most closely related to *Periglischrus strandtmanni* Tibbetts, which also occurs on chilonycterine bats, but of the genus *Mormoops*.

The question of degree of intraspecific variation in *Periglischrus elongatus* is still open. Two abnormal female specimens are at hand from *Pteronotus parnellii fuscus* taken in Peninsula de Azuero (Los Santos Province), 24 February 1962. In these the characteristics of the species are for the most part greatly exaggerated. The legs are stouter and more heavily sclerotized, and more of the ventral setae are modified into heavily fringed "palmate" setae. More striking is the presence of a strong, deep camerostome bordered posteriorly by the sternal plate and laterally by heavily sclerotized margins. The dorsal propodosomal setae are modified into short, stout, blunt spines. Whether these two specimens represent genetic freaks or are actually representative of a distinct population is unknown. The single male at hand from this area is apparently normal.

Periglischrus strandtmanni Tibbetts

Periglischrus strandtmanni Tibbetts, 1957, Jour. Kansas Ent. Soc., 30, (1), p. 14, pls. 1-3—United States National Museum, Washington (Frio Cave, Uvalde County, Texas, from *Mormoops megalophylla senicula*). Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 199.

This mite has been recorded previously only from the type collection, from Texas, and while it has not been collected in Panama, a recent collection from Trinidad indicates its probable occurrence in Panama.

Comparison of a female specimen from Trinidad with Tibbetts' description and figures demonstrates close agreement. However, the "Y"-shaped anal plate with two long posterior setae described by Tibbetts as dorsal in position is actually ventral just as in the new species, *P. elongatus*, described in the present publication; the two long setae are adanal setae. Tibbetts' species lacks the pair of adanal, shell-like sclerotized platelets flanking the anal plate of *P. elongatus*. The anal opening and minute postanal seta are dorsal in position and appear just as described for *P. elongatus*. Many of the ventral leg setae are sparsely bipectinate, but none show the inflated "palmate" appearance characteristic of *P. elongatus*. Other differential characters are given in the discussion of the latter species.

The specimen recorded here is a female taken from *Mormoops megalophylla tumidiceps* Miller, at Mount Tamana Caves, Trinidad, by T. H. G. Aitken, 20 November 1957.

Periglischrus inflatiseta, new species. Plate 39.

The female of *Periglischrus inflatiseta* differs from all other members of the genus in possessing characteristically inflated setae on the venter. The male is very similar to *Periglischrus tiptoni* from which it differs in its smaller size, its much shorter and broader, blunt, ventral setae on legs I and II, shorter anterior legs, and in the absence of strongly serrated setae on tarsus III.

DESCRIPTION, FEMALE (pl. 39, figs. 1, 2): A relatively small mite for the genus with idiosoma of gravid specimens broadly rounded anteriorly and opisthosoma moderately flared in fan shape. Idiosoma of type specimen 760 μ long by 454 μ wide.

Dorsum.—Overall outline of two dorsal plates ovate with broad end anterior. Anterior plate 230 μ long on mid-line by 244 μ wide; broadest at level of coxae II; with 10 pairs of obvious alveoli, some bearing microsetae; a longitudinal median slit seen in all mounted specimens may represent merely a zone of weakness resulting in an artifact; posterior margin truncate and bridged to posterior plate by two small, submedian lobes. Posterior plate approximately triangular with posterior apex rounded; 83 μ long by 151 μ wide; seven pairs alveoli of which subterminal pair bear microsetae. Propodosomal setae minute, especially first two pairs; ratio distance between bases first pair setae to that between first and second pairs approximately 2:1. Pair of minute metapodosomal setae mesad of stigmata. Four pair minute setae on opisthosoma. Minute postanal seta subterminal. Peritremes extend almost to level of second pair propodosomal setae.

Venter.—Sternal plate longer (100 μ) than wide (98 μ), pentagonal with rounded corners, concave antero-lateral margins, and straight to concave posterior margin; three pairs short simple setae on margins, first pair 18 μ long, others 26 μ long. Pair metasternal setae lateral to posterior corners sternal plate, strongly sclerotized, flattened and broadly fusiform basally, abruptly acuminate distally, 39 μ long by 15 μ wide. Pair epigynial setae similar to metasternals but smaller, arising from small, poorly sclerotized epigynial platelet behind transverse genital slit; small, fan-shaped pattern of striae on cuticula anterior to genital slit. Opisthosomal pattern of sclerotization similar to that of *P. iheringi*. Opisthosoma with 10 pairs setae in addition to adanal pair: pair small, normal, submedian setae on anterior of opisthosoma followed in diverging rows posteriorly by two pairs prominent inflated setae of same type as metasternals but larger; smaller inflated pair submedian setae at mid-opisthosomal level; remaining setae on posterior half of opisthosoma normal, slightly fusiform, arranged as in *P. tiptoni*. Anal plate as described for *P. tiptoni*.

Legs.—Short, stout; leg I 405 μ long exclusive of ambulacrum. Coxal setae well developed: I with two acicular setae, basal slightly longer than distal; anterior seta of II fusiform, posterior one longer than others (72 μ), minutely barbed; anterior seta of III small, normal, posterior one large, 34 μ long, broadly fusiform, similar to metasternals; seta of IV well developed, normally setiform with slightly fusiform base. Ventrally trochanter, femur and tarsus I and segments of II exclusive of coxa, each with one or more prominent, short, stout, blunt, flattened setae with tendency toward slight barbs on one edge; III and IV with several strong postero-ventral setae, fusiform basally, acutely tipped. Dorsally setal vestiture normal for genus with long setae minutely barbed; femora I and II each with minute antero-basal seta; III and IV each with two small basal setae.

Gnathosoma.—Gnathosomal setae small, acicular; distal hypostomal pair similar, but twice as long; outer hypostomal pair vestigial; inner pair absent. Palpal tibia with very slight medio-distal lobe; trochanter with blunt, ventral, flap-like emargination distally. Chelicerae normal for genus.

MALE (pl. 39, figs. 3, 4): Idiosoma broadly ovoid, widest at level of coxae II–III; 405 μ long by 356 μ wide. Opisthosoma rudimentary.

Dorsum.—Dorsal plates as in *Periglischrus tiptoni* but smaller; anterior plate 246 μ long by 246 μ wide; posterior plate 120 μ long by 148 μ wide. Propodosomal setae short,

subequal, 16–20 μ long; ratio of distance between first pair of setal bases to that between first and second pairs approximately 2:1. Unarmed opisthosoma bearing one pair small setae.

Venter.—As described for *Periglischrus tiptoni* with following exception: first and third pair of large setae in space between coxae IV basally inflated.

Legs.—Leg I 440 μ long exclusive of ambulacrum. Coxae with relatively long setae; posterior seta of II 59 μ long, that of III 48 μ long. Ventrally trochanter and femur I each with two prominent, blunt, broadly fusiform, short setae; similar though less prominent setae on patella and tibia; tarsus I with short, broad fusiform seta proximal to mid-level. Ventrally leg II with short, broad fusiform setae on all segments but coxa. Ventral setae of III and IV tend to be basally inflated and terminate in acute tips. Tarsi III and IV ventrally each with one proximal and a pair of short, subapical, bluntly conical, stout setae in addition to others. Dorsally femur I with one to two minute setae, femur II with one, femur III with two, and femur IV with one minute setae. Tarsus IV with pair strongly serrate dorsobasal setae; tarsus III lacking serrate setae.

Gnathosoma.—Gnathosomal and distal hypostomal setae subequal, 17 μ long; outer hypostomal setae minute; inner hypostomals absent. Similar in general appearance to *P. tiptoni* but lateral seta of palpal femur not prominently serrated, and two stout apical setae of tibia are particularly well developed in *P. inflatiseta*.

TYPE MATERIAL: Holotype female, allotype male, and 5 paratypes including 3 females, 1 male and 1 female deutonymph (host no. 43065) collected by V. J. Tipton from *Phyllostomus hastatus panamensis* at Panama City (Panamá), June 1961. Paratype series also includes the following: 1 female from *Phyllostomus hastatus panamensis*, Chepo Road (Panamá), C. M. Keenan and V. J. Tipton, 8 October 1959. From *Phyllostomus hastatus hastatus*, 1 female and 2 males, Heights of Guanapo, Trinidad, T. H. G. Aitken, 19 May 1958; a female, male and protonymph, at Heights of Guanapo, Trinidad, W. G. Downs, 7 November 1956; 3 females and 1 male from same location, T. H. G. Aitken, 11 August 1957.

Holotype, allotype and 2 paratypes, male and female, in the United States National Museum; 2 paratypes (male and female), Chicago Natural History Museum and Trinidad Regional Virus Laboratory; remaining material in the collection of the author.

OTHER MATERIAL EXAMINED: In addition to the paratypes listed above, 1 male and 2 females were taken from (2) *Phyllostomus hastatus* by K. von Sneidern at La Macarena, Río Guapayá, Colombia, 14 March 1957.

REMARKS: *Periglischrus inflatiseta* is usually found in association with *Periglischrus tiptoni* on subspecies of *Phyllostomus hastatus*, but the more common *tiptoni* apparently occurs on a wider range of host species.

Periglischrus iheringi Oudemans

Periglischrus iheringi Oudemans, 1902, Ent. Ber., 1, (6), p. 38—Rijksmuseum für Natuurlijke Historie, Leiden (São Paulo, Brazil, from *Vampyrops lineatus*). Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 197, pl. 30.

This species was adequately redescribed by Rudnick (1960). Specimens identified as this species in the current study agree closely with Rudnick's description. Slight intraspecific differences appear in some characters such as the length of the small antero-basal seta on the dorsal aspect of femur II of the female. For example, in specimens from *Artibeus lituratus palmarum* this seta is consistently larger than in specimens from *Artibeus j.*

jamaicensis; in Rudnick's (1960) figure of this species he has omitted the small, dorsal, antero-basal seta of femur II. On some females three pairs of ventral alveoli can be seen, arranged in two diverging rows between and posterior to coxae IV; minute setae are visible in the alveoli on some well-mounted specimens.

The female may be distinguished from other species by the following combination of characters: A large mite with expansile, fan-shaped opisthosoma. Palpal tibia lacking prominent subapical lobe. Anterior pair dorsal propodosomal setae tiny, usually inserted on dorsal plate; other propodosomal setae long (up to 67μ). Ratio of distance between bases of first pair propodosomal setae to that between bases of first and second pairs less than 3:1. Posterior seta coxa II much longer than other coxal setae, minutely barbed; posterior seta coxa III approximately 55μ long, inflated, blade-like; postero-ventral margins legs III and IV with several straight, blade-like setae. Proximal dorsal seta of femur, genu and tibia II long.

The male of *Periglischrus iheringi* resembles that of the new species *Periglischrus aitkeni*. It may be differentiated by the longer, dorsal, propodosomal setae (up to 73μ long), by the longer spermatophoral processes (198μ long) and by the position of the anterior pair of dorsal propodosomal setae which are more closely approximated; the ratio of the distance between the bases of the first pair of propodosomal setae to that between the first and second pair ranges from 1.7:1 to 2.2:1 (19 specimens measured); this compares to a ratio of 5.5:1 for *P. aitkeni*. From the closely related *Periglischrus vargasi*, males of *P. iheringi* may be distinguished by the presence of, at most, one small to medium-sized dorsal seta on femur II, in contrast to two minute to small setae in this position on *P. vargasi*.

Periglischrus iheringi is the most commonly encountered spinturnicid in collections seen from Panama. Not only does it occur in considerable numbers on its hosts, but it infests an unusually large number of bat genera of the family Phyllostomidae, and even extends to the Desmodidae.

MATERIAL EXAMINED: The following new distribution records represent collections made by V. J. Tipton alone or with C. M. Keenan. Each collection was from a single bat. From *Uroderma b. bilobatum*: Summit Gardens (Canal Zone), 3 collections of 1 female, of 1 male, and of 4 females, 2 males and 1 nymph, 11 September 1959; Bocas del Toro Province, 3 females, 5 February 1960; Escobal (Colón), 1 female, 28 September 1960; Rodman Dispensary (Canal Zone), 5 females, 2 males and 3 nymphs, 27 April 1961. From *Vampyrops vittatus*: Cerro Punta (Chiriquí), 2 females, 2 males, 2 nymphs, 5 February 1960; Río Changena (Bocas del Toro), 3 females, 4 males, 1 nymph, 24 September 1961, and 2 males, 1 nymph, 20 September 1961. From *Vampyrops helleri*: Fort Sherman (Canal Zone), male and nymph, 2 December 1959; Almirante (Bocas del Toro), 2 collections of 2 males and of a female, male, 2 nymphs, 23 January 1960, and of a female and 2 males, 24 January 1960; Cerro Hoya (Los Santos), 1 male, 10 February 1962, 1 male on 13 February 1962 and 1 female on 24 February 1962. From *Vampyressa pusilla*: from Cerro Hoya, two collections of 1 female and of 1 nymph on 10 February 1962, 3 females and 1 male on 22 February 1962 and 2 females on 24 February 1962. From *Vampyrodes major*: Bocas del

Toro Province, 1 male, 25 January 1960; Peña Point (Darién), two collections comprised of 3 females, 3 males, 2 nymphs, 24 March 1960; Río Setegantí (Darién), 1 female and 1 male on 1 February 1961, 1 male on 23 September 1961 and 2 females, 1 male and 2 nymphs on 24 September 1961. From *Chiroderma salvini*: Río Changena (Bocas del Toro), 1 male, 22 September 1961. From *Artibeus toltecus*: Casa Lewis, Cerro Punta (Chiriquí), two collections of 1 female and 1 nymph and of 1 female on 5 February 1960, and of 1 male on 3 February 1960; Río Changena (Bocas del Toro), two collections of 1 female each, 20 September 1961. From *Artibeus j. jamaicensis*: Fort Kobbe (Canal Zone), numerous specimens, 13 October 1960, and 1 male and a nymph on 24 July 1959; Bocas del Toro Province, 4 collections of 1 male, of 6 females, of 1 female and of 2 females, 1 male and 1 nymph on 23 January 1960; other collections from the same area are 3 collections of several specimens on 24 January 1960, two collections totaling 5 specimens on 25 January 1960, 1 female on 26 January 1960, one to several specimens from single collections on 27, 28 and 30 January 1960 and 1 February 1960; Peña Point (Darién), female and nymph, 24 March 1960; Fort Clayton (Canal Zone), 3 females, 19 October 1960; Río Setegantí (Darién), 8 collections of from 1 to 5 specimens each from 1 to 5 February 1961, and 2 collections of several specimens each on 17 and 20 September 1961. From *Artibeus j. jamaicensis*: Río Changena (Bocas del Toro), female, 2 males and nymph on 21 September 1961, 1 male and nymph on 22 September 1961 and 1 female on 23 September 1961. From *Artibeus lituratus palmarum*: Paraíso (Canal Zone), male, 5 November 1959; Fort Sherman (Canal Zone), male and nymph, 4 December 1959; Fort Clayton (Canal Zone), several, 19 October 1960; Bocas del Toro Province, male, 24 January 1960; Río Setegantí (Darién), 7 collections from 1 to 5 February 1961, each containing from one to several mites; Juan Mina (Canal Zone), female, 29 June 1961; from Cerro Hoya, one female, 21 February 1962. From *Artibeus cinereus*: Río Changena (Bocas del Toro), 4 collections, 18 to 24 September 1961, each containing from one to several mites; from Cerro Hoya, one female, 12 February 1962. From *Artibeus aztecus*: Chiriquí Province, 2 collections of 1 female and 2 females, 2 March 1962. From *Artibeus* species: Río Changena (Bocas del Toro), several specimens, 24 September 1961. From *Enchisthenes harti*: Cerro Hoya (Los Santos), 3 females, 5 males, 8 March 1962; from same locality, 4 collections of 1 to 3 mites each, 9 to 18 February 1962. From *Desmodus rotundus murinus*: Bocas del Toro Province, female and male, 23 January 1960, and 2 males, 25 January 1960; Cerro Punta (Chiriquí), 2 females, 5 February 1960.

Periglischrus aitkeni, new species. Plate 40.

Periglischrus aitkeni resembles *Periglischrus iheringi*, from which females may be distinguished in having the first pair of dorsal propodosomal setae well developed and inserted very near the bases of the second pair of propodosomal setae. Males differ in having a relatively short spermatophoral process, less than 100 μ long, and in having the anterior, dorsal propodosomal setae displaced far laterad.

DESCRIPTION, FEMALE (pl. 40, figs. 1, 2): A large, typical number of the genus with idiosoma broadly rounded anteriorly and opisthosoma moderately flared. Idiosoma 1134 μ long by 594 μ wide.

Dorsum.—Anterior plate approximately 310 μ long on mid-line by 275 μ wide, with broadly rounded anteromedial projection, and pronounced shoulders; sides slightly concave anteriorly and slightly convex posteriorly; posterior margin truncate, slightly concave and joined to posterior plate by two submedian lobules; 11 pairs alveoli in pattern similar to that in *Periglischrus iheringi*. Posterior plate bluntly triangular, 130 μ long by 190 μ wide, widest anteriorly and terminating in broadly rounded posterior margin; bearing five pairs prominent alveoli, the posterior pair bearing microsetae. Propodosomal setae all moderately developed, second pair 45–50 μ long, others obviously shorter; ratio of distance between bases of first pair to that between first and second pairs approximately 5:1. Unarmed opisthosoma with four pairs small setae. Postanal seta minute, subterminal.

Venter.—Sternal plate as broad as long, 146 μ , outline that of broadly rounded pentagon with narrowest angle anterior; three pairs small sternal setae located just off margins of plate; two pairs pores on plate, in some specimens serving as foci for invaginations of eroded plate margins. Epigynial platelet a small, narrow, longitudinal sclerite with membranous posterior enlargement; pair small genital setae located off plate anterior to posterior lobe. Pattern of sclerotized opisthosomal areas and opisthosomal setation as in *P. tiptoni* and *P. iheringi*, but anterior three pairs setae vestigial or absent and represented only by alveoli; other setae small. Anal plate as described for *P. tiptoni*, but adanal setae 33 μ long, over twice as long as other opisthosomal setae.

Legs.—Well developed, stout; leg I 545 μ long exclusive of ambulacrum. Posterior seta coxa II 195 μ long, minutely barbed; posterior seta coxa III 39 μ long, broadly blade-like; other coxal setae much smaller, acicular. Other ventral leg segments with mostly short, simple setae, usually with inapparent, minute barbs on longer setae; several posterior setae of legs III and IV expanded, blade-like. Longer dorsal setae minutely barbed. Dorsal surfaces of femora with a minute seta only on legs II and III.

Gnathosoma.—Distal hypostomal setae 22 μ long, about twice as long as gnathosomal pair. Inner and outer hypostomal setae apparently absent. Palpal tibia lacking pronounced medio-distal lobe; trochanter with blunt, ventral, flap-like emargination distally. Chelicerae normal for genus.

MALE (pl. 40, figs. 3–5): Idiosoma ovoid, widest at level of coxae II–III; 600–620 μ long by 488–513 μ wide. Legs stout, of moderate length.

Dorsum.—Shape of dorsal plates and alveolar pattern similar to those of *Periglischrus iheringi*; some of alveoli bearing microsetae as illustrated. Propodosomal setae well developed, setiform, measuring 49–55 μ long; ratio distance between bases of first pair to that between first and second pairs approximately 5.5:1. Unarmed opisthosoma with pair of short (18 μ) setae subterminally. Postanal seta minute, dorsoterminal.

Venter.—Sternal plate longer than wide, modified cordate with pronounced medial anterior projection and prominent shoulders; with five pairs well developed acicular setae, anterior-most of which extend to level of imaginary line projected between bases of second pair; pair of minute setae behind sternal plate. Anal plate large, elongate, occupying most of space between coxae IV, truncate anteriorly with sides constricted slightly just anterior to adanal setae; adanal setae inserted just anterior to anus; three other pairs subequal setae anteriorly on anal plate and three pairs bordering plate. Pair of subterminal accessory platelets bordering posterior end of anal plate.

Legs.—Well-developed, stout; leg I approximately 540 μ long exclusive of ambulacrum. Coxal setae all well developed, typically setiform; posterior seta of coxa II over twice as long as other coxal setae, approximately 165 μ long; anterior seta of coxa III shortest, 30 μ long. Other leg segments ventrally with short but strong simple setae; ventro-lateral setae of legs III and IV longer and minutely barbed; pair of short subterminal setae of tarsus II spine-like. Long dorsal setae minutely barbed and notched apically. Femur II with only one of dorsal setae minute; no minute setae on other femora.

Gnathosoma.—Gnathosomal and distal hypostomal setae subequal, well developed, 28 μ long. Inner hypostomal setae absent; outer hypostomals vestigial but alveoli easily observed. Palpi normal for genus. Spermatophoral process a strong tubular structure recurved in shallow hook distally, short for the genus, measuring approximately 80 μ long in allotype.

TYPE MATERIAL: Holotype female and allotype male (colln. no. T60) together with 3 paratype females collected by T. H. G. Aitken from *Sturnira lilium lilium*, at the 15 $\frac{3}{4}$ mile mark on Churchill-Roosevelt Highway, Trinidad, 17 June 1958. Other paratypes are as follows: 3 females from *Sturnira lilium parvidens*, at the Río Mandinga (San Blas), V. J. Tipton, 27 May 1957; 5 females from *Sturnira lilium*, at Rancho Grande, Venezuela, C. O. Handley, 30 March 1960; 3 females and 1 protonymph from the same host, Los Santos Province, V. J. Tipton, 24 February 1962; one female from *Sturnira ludovici*, Cerro Punta (Chiriquí), Republic of Panamá, C. M. Keenan and V. J. Tipton, 30 April 1961. Holotype, allotype and 3 female paratypes, in the United States National Museum; 2 paratypes (male and female), Chicago Natural History Museum and Trinidad Virus Laboratory; remaining material in the collection of the author.

OTHER MATERIAL EXAMINED: From *Sturnira lilium*, Bocas del Toro Province, 1 female, C. M. Keenan and V. J. Tipton, 23 January 1960; from *Sturnira ludovici*, Cerro Punta (Chiriquí), C. M. Keenan and V. J. Tipton, 1 male and 1 female deutonymph on 2 February 1960, 1 female, 1 male and 1 male deutonymph on 3 February 1960, 2 females on 3 February 1960, 1 male deutonymph on 3 February 1960, 1 male and 1 protonymph on 15 February 1960, 1 female, 1 May 1960, and 1 male on 1 May 1960; from the same host, Chiriquí Province, a male, male deutonymph and a protonymph, V. J. Tipton, 6 March 1962; from *Sturnira* species in Los Santos, 3 females and 2 protonymphs on 1 host specimen and 2 males on another specimen, V. J. Tipton, 6 March 1962; from *Noctilio leporinus* at Guánico (Los Santos), 5 females and 2 males, V. J. Tipton, 24 January 1962.

REMARKS: *Periglischrus aitkeni* is a rather common parasite of phyllostomid bats of the genus *Sturnira* in Central America. In view of the usually rather restricted host range of *Periglischrus*, it was surprising to find several typical specimens of *P. aitkeni* from a single *Noctilio leporinus*, a fish-eating bat of the superfamily Emballonuroidea.

This species is named in honor of Dr. T. H. G. Aitken, entomologist at the Trinidad Regional Virus Laboratory of the Rockefeller Foundation, who collected the type specimens and has provided many of the other collections upon which this study is based.

Periglischrus desmodi, new species. Plate 41.

Periglischrus desmodi is closely related to *P. vargasi*. Characters distinguishing the female include the very widely spaced first pair of dorsal propodosomal setae, the characteristic shape of the sternal plate and the presence of only one minute basal seta on the dorsum of femur II instead of two. Characters distinguishing the male include long sternal plate setae, three pairs of dorsal opisthosomal setae and a pair of well-developed setae behind the sternal plate.

DESCRIPTION, FEMALE (pl. 41, figs. 1, 2): Idiosoma broadly rounded anteriorly, with opisthosoma slightly to moderately expanded; approximately 920 μ long by 486 μ wide; a moderately robust species with long setae.

Dorsum.—Anterior dorsal plate large, 297 μ long on mid-line, by 292 μ wide; rounded apex projecting from broad anterior margin; broad, relatively straight posterior margin at level of coxae IV, with two submedian rounded protuberances received by anterior margin of posterior plate; bearing nine pairs of prominent alveoli, three pairs of which bear minute setae. Posterior plate small, with anterior margin contacting anterior plate with two submedian emarginations to receive corresponding projections from anterior plate; broader than long with posterior margin broadly rounded; with eight pairs of alveoli, of which two pairs bear minute setae. Propodosomal margin with five pairs long, subequal setae of approximately 85 μ ; ratio of distance between first pair to that between first and second pairs varies from 6.6:1 to 8.4:1. Opisthosoma with six pairs setae, of which the longest are anterior. Posterior tip of anus normally dorsal, bearing minute postanal seta.

Venter.—Sternal plate a modified pentagon longer than wide, with broad base, rounded sides and narrowly tapering anterior apex; three pairs of short setae may be off plate although on type first and third pair are included in plate; two pairs of pores on plate. Pair of short metasternal setae. Epigynial plate reduced, slender, long, slightly expanded anteriorly; pair of short genital setae located off plate, insertions spaced 10 μ apart. Opisthosoma bearing three pairs small setae in two diverging rows behind epigynial plate; three pairs on median sclerotized area anterior to anal plate, two pairs anterior to this sclerotization, two pairs postero-lateral and one pair lateral to the sclerotization. Sclerotized areas of opisthosoma as illustrated, similar to those of *P. iheringi*. Anal plate ventro-terminal, elongate, narrow with pair adanal setae subequal to adjacent opisthosomal setae; canal-like structures extending anteriorly from adanal setal bases. Minute postanal seta dorsal.

Legs.—Relatively short, stout; leg I 476 μ long exclusive of ambulacrum; coxal setae, with exception of posterior seta of II, short, nude and unmodified; posterior seta of II elongate and minutely barbed; most other ventral leg setae normal with larger setae minutely barbed; legs I and particularly II with row of inflated, leaf-like setae very prominently serrated; femur, patella and tibia IV each with a slightly inflated, scimitar-shaped, postero-ventral seta; dorsal setae of legs strong, many elongate; of two basal setae on femur II the posterior one is of medium size and anterior one is small.

Gnathosoma.—Inner and outer hypostomal setae absent; pair distal hypostomal setae about twice as long as short gnathosomal pair; long paired hypostomal processes present. Palpi with five movable segments; tibia with moderately developed medial distal lobe. Chelicerae normal for genus.

MALE (pl. 41, figs. 3-5): Idiosoma ovoid, widest at level of coxae II-III; 485 μ long by 350 μ wide. Opisthosoma rudimentary.

Dorsum.—Anterior and posterior dorsal plates similar to those of female in size, shape, surface markings and setation, although the posterior plate tends to have concave postero-lateral margins and the plates appear compressed together, rendering the line of separation indistinct; the two plates cover most of idiosoma. Propodosomal setae as in female but approximately 60-67 μ long; ratio of distance between alveoli of first pair to that between first and second pairs approximately 6:1. Three pairs small setae on narrow cuticular margin bordering postero-lateral edges of posterior dorsal plate; post-anal seta minute, terminal.

Venter.—Sternal plate modified cordate with elongate antero-median projection terminating at male genital opening; longer than wide; bearing five pairs well-developed setae ranging from 63 μ long anteriorly to 43 μ for posterior pair. Pair of medium-sized setae 30 μ long posterior to plate. Five and occasionally six pairs setae up to 36 μ long located in space between coxae IV and anterior to anal plate. One pair setae lateral to anal plate and mesad of pair of small adanal platelets. Anal plate small, elongate, with indistinct anterior margins; pair of adanal setae about 20 μ long anterior to anal opening, which is terminal.

Legs.—Leg I 450 μ long exclusive of caruncle. With exception of posterior seta of coxa II, coxal setae longer than in female although of same type; other ventral leg setae simple, acicular, small; dorsal setae similar to those of female, but tarsus I bearing two long, specialized, blunt setae.

Gnathosoma.—Pair gnathosomal setae 18 μ long, acicular; outer hypostomal pair minute; distal hypostomal setae subequal to gnathosomal pair. Palpal tibia lacking medial lobe of female; trochanter with distal flange-like lobe. Chelicerae with fixed digit well developed, bearing numerous sharp subterminal "teeth" on surface opposed to movable digit; latter slightly longer than fixed digit and bearing blunt-tipped teeth along inner surface; spermatophoral process a long tubular, recurved structure over 150 μ in length.

MALE DEUTONYMPH: Idiosoma shape similar to that of male, 497 μ long by 362 μ wide.

Dorsum.—Similar to that of male.

Venter.—Sternal plate approximately diamond-shaped with corners rounded, bearing three pairs well-developed acicular setae; pair setae bordering postero-lateral margins of plate. Anal plate and remaining setae of venter as in male.

Legs.—As in male but lacking long, blunt-tipped setae on tarsus I.

Gnathosoma.—Similar to that of male, but chelicerae as in female.

PROTONYMPH: A broadly elliptical mite with relatively short, very robust legs.

Dorsum.—Anterior and posterior plates similar in shape and sculpturing to those of female, but covering most of idiosoma. Propodosomal margin bearing four pairs long setae. Peritremes short, entirely dorsal, extending from level of posterior margin of coxae III, terminating posterior to insertion of fourth pair propodosomal setae. Pair of long metapodosomal setae inserted just mesad of stigmata as in adults.

Venter.—Sternal plate very lightly sclerotized, roughly diamond-shaped with rounded corners, bearing three pairs well-developed setae. Four pairs well-developed setae between sternal plate and anal plate. Anal plate elongate, narrow with rounded anterior margin; pair of well-developed adanal setae on plate anterior to anal opening; postanal seta minute.

Legs.—Setation similar to that of male deutonymph.

Gnathosoma.—Similar to that of male deutonymph but palpi relatively short and stout.

TYPE MATERIAL: Holotype female (colln. no. T279) collected by T. H. G. Aitken from *Desmodus rotundus rotundus* at St. Patrick's Estate, Arima Valley, Trinidad, 16 May 1957. Allotype male (host. no. 9182) collected by V. J. Tipton from *Desmodus rotundus* at Guánico (Los Santos), 27 January 1962. Four paratypes (1 female, 1 deutonymph and 2 protonymphs) same data as male allotype; 1 paratype protonymph same data as holotype female; 4 paratype females from (3) *Desmodus rotundus*, Chiriquí Province, V. J. Tipton, 6, 7, 11 March 1962; 1 paratype female from *Desmodus rotundus murinus*, Casa Tilley, Cerro Punta (Chiriquí), C. M. Keenan and V. J. Tipton, 6 February 1960; 14 paratypes (10 females, 3 males, 1 deutonymph) from *Desmodus r. rotundus* at Antilles (Kern Trinidad Oilfields Ltd.), La Brea, Trinidad, T. H. G. Aitken, 14 April 1958.

Holotype, allotype, 3 male and 2 female as well as proto- and deutonymph paratypes in the United States National Museum; 1 male, 2 female paratypes, Chicago Natural History Museum; 2 male, 2 female paratypes, Trinidad Regional Virus Laboratory; remaining material in the collection of the author.

Many other specimens of this species from Trinidad are in the author's collection, all taken from *Desmodus r. rotundus*.

Periglischrus caligus Kolenati. Plate 42.

Periglischrus caligus Kolenati, 1857, Wien. Ent. Monatschr., 1, (2), p. 60—Type deposition unknown (Brazil and Surinam, from *Glossophaga soricina*). Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 196.

Periglischrus caligus bears a general resemblance to *P. vargasi* from which females may be separated by the presence of a strong medio-distal lobe on the palpal tibia; females differ from all species of the genus in having broadly inflated, scimitar-shaped setae on the postero-ventral margins of legs IV. Males are characterized by their small size, short legs, simple leg setae, small sternal plate setae and position of the dorsal propodosomal setae.

As pointed out by Rudnick (1960), this species has been known only from Kolenati's (1857) original figures and description, which do not present valid characters for a specific diagnosis. Through the courtesy of Dr. Marc André, a female specimen was examined which had been identified as this species by Kolenati and deposited in the Museum National d'Histoire Naturelle, Paris. This proved to be the same as numerous specimens collected recently from *Glossophaga soricina leachii* from Panama, and *Glossophaga s. soricina* from Trinidad.

Since the location of the types of *Periglischrus caligus* is unknown, the female is redescribed and illustrated here and the male is described for the first time.

DESCRIPTION, FEMALE (pl. 42, figs. 1, 2): A large, broadly rounded mite with inflated opisthosoma and relatively short, stout, strongly setose legs. Idiosoma 890–1080 μ long by 640 μ wide.

Dorsum.—Anterior plate approximately as wide as long, widest at level of posterior one-third, with broadly rounded anterior margin, slight shoulders and convex sides; posterior margin truncate, slightly concave and joined to posterior plate by two submedian lobules; with 11 pairs alveoli arranged as illustrated. Posterior plate bluntly triangular, 98 μ long by 146 μ wide, bearing seven pairs of alveoli, the posterior pair containing microsetae. Propodosomal setae all long, measuring up to 70 μ ; ratio of distance between bases of first setal pair to that between first and second pairs ranges from 1.2:1 to 1.4:1 based on five specimens. Unarmed opisthosoma with four small setae. Postanal seta minute, subterminal.

Venter.—Sternal plate longer (110 μ) than broad (82 μ), roughly pentagonal with tapering anterior margin terminating in narrowly rounded tip; bearing two pairs pores; three pairs small setae about 11 μ long located off margin of plate; subequal pair meta-sternal setae postero-lateral to plate. Epigynial plate a small, narrowly longitudinal sclerotization between coxae IV, slightly constricted opposite insertion of very small pair of genital setae which are off the plate. Pattern of sclerotized opisthosomal areas, including anal plate, and opisthosomal setation as described for *Periglischrus tiptoni* except that the three pairs of minute anterior setae arranged in diverging rows are reduced to two pairs of alveoli with no evident setae. Adanal pair of setae 18 μ long.

Legs.—Relatively short, stout, strongly setose. Leg I 350–370 μ long exclusive of ambulacrum. Posterior seta of coxa II 91 μ long, minutely barbed; other coxal setae all minute, simple and very fine. In addition to usual ventral setation legs I and II with strongly serrated, leaf-like setae on posterior margins; similar setae on anterior margins of legs III and IV; femur, patella and tibia IV each with large, inflated, scimitar-like posterior seta. Dorsally long setae superficially appear nude but minute barbs present; femur and patella II each with two minute to small basal setae plus two long setae.

Gnathosoma.—Distal hypostomal setae about one-third longer than short setiform gnathosomal pair; inner hypostomal setae absent, outer pair vestigial with only alveoli

visible. Palpal tibia with prominent medio-distal lobe; trochanter with flap-like emargination extending from ventral medial sclerotization which is normally adpressed to other mouthparts. Chelicerae normal.

MALE (pl. 42, figs. 3, 4): A relatively small, ovoid mite with short, stout legs radially arranged. Idiosoma 377 μ long by 297 μ wide.

Dorsum.—Shape of dorsal plates and alveolar pattern similar to that of *Periglischrus vargasi*. Anterior plate 198 μ long by 230 μ wide. Posterior plate 104 μ long by 135 μ wide. Propodosomal setae all well developed, setiform, measuring up to 38 μ long; ratio distance between bases of first pair to that between bases of first and second pairs approximately 2.8:1. Unarmed opisthosoma with pair of short setae subterminally. Postanal seta minute, dorso-terminal.

Venter.—Sternal plate longer (159 μ) than broad (147 μ), general shape as in *P. vargasi* but postero-lateral margins concave; with usual five pairs setae of which the longer ones, anteriorly, measure approximately 24 μ and reach about halfway to imaginary line drawn between second pair. Pair of minute setae behind sternal plate. Anal plate, accessory posterior platelets and opisthosomal setae between coxae IV as in *P. vargasi*.

Legs.—Short, stout, radially arranged; leg I approximately 380 μ long exclusive of ambulacrum. Coxal setae normal, setiform; posterior seta of coxa II longest (50 μ), about one and one-half times as long as anterior seta of II; proximal seta of coxa I shortest of coxal setae (12 μ). Other leg segments ventrally with short, simple setae except for usual long tarsal trichobothria. Dorsal setae simple, setiform, superficially nude, but longer ones with minute barbs; in addition to other setae femora I and II bear two small setae, III and IV each bear one minute and one small seta.

Gnathosoma.—Gnathosomal and distal hypostomal setae subequal, acicular, about as long as distance between bases of the hypostomal pair; inner hypostomal setae absent, outer hypostomal pair of setae minute. Pair of hypostomal processes long, slightly sinuous, stylet-like structures with membranous inner borders. Chelicerae normal, with spermatophoral process recurved, approximately 150 μ long.

MATERIAL EXAMINED: Plesiotype female and male (host no. 9840) were collected from *Glossophaga soricina* at Los Santos Province, by V. J. Tipton, 10 February 1962; 2 additional males, same collection as plesiotype. Two females collected in the Canal Zone by C. M. Keenan and V. J. Tipton from *Glossophaga soricina leachii* at Empire Range, 30 September 1959, and at Coco Solo, 20 October 1959, respectively. In addition several collections identified as this species are recorded here from Trinidad, taken from *Glossophaga soricina soricina*. The plesiotype male and female are in the United States National Museum; 2 females, Chicago Natural History Museum; 1 female, Trinidad Regional Virus Laboratory; remaining specimens in the collection of the author.

Periglischrus vargasi Hoffmann

Periglischrus vargasi Hoffmann, 1944, Rev. Salub. y Enferm. Trop., Mexico, 5, (2), p. 91—Instituto de Salubridad y Enfermedades Tropicales de Mexico, Mexico, D.F. (Yerbabuena, Guerrero, Mexico from *Leptoncyteris nivalis yerbabuena*). Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 199, pl. 31.

Specimens identified as this species from Panama agree closely with the redescription given by Rudnick (1960). All females seen, including forms from the type host from Mexico, differ from figures given by both Rudnick (loc. cit.) and Hoffmann (1944) in one respect: femur, genu and tibia IV each has a relatively long (45 μ), stout, postero-ventral seta with an attenuated, recurved tip; these setae differ from comparable setae in *Periglischrus caligus* in that they are not inflated.

The following characters suffice to diagnose *Periglischrus vargasi* females: Large, stout mites approximately 1 mm. long of typical appearance for the genus. Palpal tibia lacking medio-distal lobe. All dorsal propodosomal setae well developed, the longest from 70–80 μ long. Ratio of distance between bases of first pair of dorsal propodosomal setae to that between bases of first and second pairs ranges from 1.1–1.5:1. Six pairs medium to large dorsal opisthosomal setae. Sternal plate longer than wide, broadly jug-shaped. Posterior seta of coxa III small. Two minute dorsal setae on femur II. The male of *P. vargasi* resembles closely that of *Periglischrus iheringi* from which it differs in possessing two minute dorsal setae on femur II and in the relatively small size of the posterior seta of coxa III, which is only 1.7 times as large as the anterior seta. The spermatophoral process, approximately 110 μ long, is considerably shorter than those measured for *P. iheringi*.

MATERIAL EXAMINED: From *Trachops cirrhosus* taken at Los Santos Province, 1 female collected by V. J. Tipton, 14 February 1962. From *Anoura geoffroyi*, Cerro Punta (Chiriquí), C. M. Keenan and V. J. Tipton, 1 male, 1 February 1960, and 1 female, 1 male and a protonymph, 3 February 1960; from 2 specimens, the same host, Cerro Hoya (Los Santos), V. J. Tipton, 11 February 1960, 7 females, 2 males and 1 protonymph. From *Anoura cultrata*, Chiriquí, 1 male, V. J. Tipton, 12 March 1962; Río Changena Camp, 1 male and 1 female, V. J. Tipton, 27 September 1961.

Previously recorded collections of *Periglischrus vargasi* have been made from Texas on the north to Guatemala on the south. In addition to the Panamanian collections recorded here, numerous specimens have been taken from Trinidad bats, to be reported in detail in a subsequent paper, and several specimens have been taken from Venezuela. For purposes of record the latter are included here. From (2) *Anoura cultrata* (?), Rancho Grande, Venezuela, 2 females, 2 males and 1 protonymph, C. O. Handley, 30 March 1960; from *Anoura caudifera* at the same locality, 1 female, C. O. Handley, 20 March 1960.

***Periglischrus tiptoni*, new species. Plates 43, 44.**

DIAGNOSIS: The female is distinguishable from other species of the genus by the following combination of characters: broadly jug-shaped sternal plate; five well-developed, although small, dorsal propodosomal setae, the first pair of which are very widely spaced; palpal tibia with a pronounced apical, median lobe; leg II with only one minute dorsal seta on femur in addition to large setae. It is closely related to *Periglischrus micronycteridis* n. sp., from which it is distinguished by the shape of the sternal plate, longer anterior legs and well-developed posterior seta on coxa III, as well as by host association. Males are characterized by coarsely barbed dorsal seta on tarsi III and IV and by a pair of subapical, flattened, peg-like setae ventrally on tarsi III and IV. They are similar to males of *P. inflatiseta* but lack blunt, fusiform setae ventrally on legs I and II, and no ventral setae between coxae IV are inflated.

DESCRIPTION; FEMALE (pl. 43, figs. 1, 2): A robust typical member of the genus with

idiosoma broadly rounded anteriorly and opisthosoma broadly flared in fan shape. Idiosoma 1080 μ long by 810 μ wide. An occasional unfed, teneral female has a much reduced, unexpanded opisthosoma.

Dorsum.—Overall outline of two dorsal plates ovate with anterior three-fourths consisting of the broad anterior plate; anterior plate 324 μ long by 275 μ wide; plates connected by two submedian lobes. Nine pairs alveoli on anterior plate, eight pairs on posterior plate; pair of minute setae arising from penultimate alveoli of posterior plate. Five pairs of propodosomal setae all well developed although relatively short, the longest about 45 μ long; insertions of first pair very close to those of second pair: ratio of distance between bases of first pair to that between first and second pair varies from 4.4:1 to 7:1. Peritremes extend just anterior to level of second pair propodosomal setae. Unarmed opisthosoma with four pairs of small setae. Posterior tip of anal plate extending dorsally and bearing minute postanal seta.

Venter.—Sternal plate longer (159 μ) than wide (120 μ), broadly jug-shaped with short, narrow, anterior neck and broad posterior base; with two pairs pores; three pairs short (20 μ) sternal setae just off margins of plate. Pair of metasternal setae subequal to sternals. Epigynial platelet a small longitudinal structure partially divided on antero-medial line, bearing two minute setae subterminally on slightly inflated posterior lobe of platelet. Pattern of sclerotized opisthosomal areas similar to those of *Periglischrus iheringi*. Opisthosomal setae small: three pairs minute setae arranged in diverging rows behind epigynial platelet, followed by a pair anterolateral and two pairs lateral to postero-medial, ventro-anal sclerotization, two pairs on anterior part of the latter plate and two pairs lateral to anal plate proper; anal plate proper, ventroterminal, narrowly elongate, and apparently tenuously connected to more anteriorly located, posteromedian sclerotization; pair of short adanal setae terminal on opisthosoma. Adanal setae and two pairs setae lateral to anal plate with canal-like structures extending anteriorly from alveoli.

Legs.—Well developed, stout; leg I 512 μ long exclusive of ambulacrum. Coxal setae, with exception of long, minutely barbed, posterior seta of II, acicular, nude; posterior seta of III relatively large. Ventral setation of other segments characteristic of species; posterior margins of legs I, II and IV and anterior margins of legs III and IV with long, minutely barbed setae, none markedly inflated; tibia and tarsus of leg I and patella and tibia of II each with posterodistal, inflated, recurved seta superficially appearing as a blunt, ragged cone. Dorsally most long setae inserted near distal margin of segments, minutely barbed; femoral setae normal with only anterobasal one on femur II minute and two on femur III small.

Gnathosoma.—Inner and outer hypostomal setae absent; distal hypostomal pair slightly longer than very small pair of gnathosomal setae. Palpal tibia with pronounced medio-distal lobe; trochanter with blunt, ventral, flap-like emargination distally. Chelicerae normal for genus.

MALE (pl. 43, figs. 3, 4): Idiosoma ovoid, widest at level of coxae II-III; 530 μ long by 405 μ wide. Opisthosoma rudimentary. Legs long.

Dorsum.—Shape of dorsal plates similar to those of *Periglischrus vargasi*; anterior plate as long on mid-line as broad, 351 μ ; posterior plate 162 μ long by 222 μ wide; anterior plate with 12 pairs of alveoli; posterior plate with nine pairs alveoli; microsetae visible in two pairs alveoli of posterior plate and possibly present in some of those on anterior plate. Propodosomal setae relatively short, measuring 39 μ long or less; ratio of distance between first pair of setal bases to that between first and second pairs approximately 3.5:1. Unarmed opisthosoma bearing one pair small posterior setae in addition to subequal postanal seta.

Venter.—Sternal plate longer than wide, modified cordate with pronounced medial anterior projection and prominent shoulders; with five pairs long, strong setae and two pairs submedian pores; two additional pairs of lateral marginal pits. Pair of minute setae behind sternal plate. Six pairs well-developed setae in addition to slightly smaller adanal pair in space between coxae IV; three pairs bordering anal plate (two pairs of these may occur on plate), one pair between anal plate and pair of small adanal platelets, two pairs on anterior half of anal plate; adanal setae border anterior margin anal

opening. Anal plate elongate, broadly rounded anteriorly, broadest at mid-level and with concave posterolateral margins, ending bluntly at anterior margin of anal opening.

Legs.—Leg I of allotype 600 μ long exclusive of ambulacrum, up to 670 μ in some paratypes. Coxae with relatively long setae; posterior seta of coxa II 81 μ long, less than one and one-half times as long as posterior seta of coxa III. Ventral leg setae tend to be flattened and tooth-like; tarsus I and tibia and tarsus II each with a broad, serrated, blunt seta; tarsi III and IV each with pair of subapical flattened peg-like setae. Dorsal setae strong, with longer setae coarsely barbed and several of shorter setae serrate; one minute seta on femur II, III and IV; tarsi III and IV with strong, coarsely barbed setae.

Gnathosoma.—Gnathosomal and distal hypostomal setae subequal, 27 μ long; outer hypostomal setae minute; inner hypostomals absent. Palpal tibia without medio-distal lobe; femur with prominent serrated lateral seta. Chelicerae normal for genus, each with very elongate (over 170 μ), recurved, tubular, spermatophoral process terminating in two minute fimbriae.

FEMALE DEUTONYMPH (pl. 44, figs. 1, 2): Very similar to adult male, from which it differs as follows: Idiosoma 650 μ long. Unarmed dorsal opisthosoma with five pairs small (approximately 10 μ long) marginal setae in addition to small postanal seta. Sternal plate a rounded diamond shape, longer than wide, bearing three pairs well-developed setae and two pairs pores; pair of setae subequal to sternals located off posterolateral margins of plate; slightly smaller pair just posterior to plate, followed by pair of very small setae. Eleven additional pairs well-developed setae on unarmed ventral integument between coxae IV. Anal plate terminal, pear-shaped with broad end posterior; adanal setae well developed, anterior to anal opening which is on posterior tip of body. Chelicerae as in female. Tarsi of legs I lack the two long, blunt-tipped sensory setae observed in adult males.

MALE DEUTONYMPH (pl. 44, figs. 3, 4): Similar to female deutonymph, from which it differs in having only one pair small setae on the unarmed margin of dorsal posterior opisthosoma, and in possessing only six pairs of setae on the unarmed ventral integument between coxae IV.

PROTONYMPH (pl. 44, figs. 5, 6): Similar in general appearance, size and body shape to deutonymphs, from which it is immediately distinguishable by short dorsal peritremes extending from level between coxae III-IV to just beyond posterior margin of coxa II. Propodosoma possessing only four pairs relatively short marginal setae, ranging from 24-30 μ long. In other respects dorsum as in male deutonymph.

Venter as in male deutonymph from which it differs as follows: Lacking pair of well-developed setae posterolateral to sternal plate and pair just posterior to plate; small pair of setae behind sternal plate somewhat larger than in deutonymph and located in region between coxae IV; total of four pairs setae arising from unarmed cuticula in area between coxae IV. Gnathosoma and legs as in deutonymphs.

TYPE MATERIAL: Holotype female and allotype male (host no. 43065) collected by V. J. Tipton from *Phyllostomus hastatus panamensis* at Panama City (Panamá), June 1961. Paratype series, all, unless noted, collected by C. M. Keenan and V. J. Tipton: female, female deutonymph and male from *Phyllostomus h. panamensis* at Chepo Road (Panama), 8 October 1959; male deutonymph, same host, Fort Kobbe (Canal Zone), 9 October 1959; female, same host, Chilibrillo Caves (Panamá), 28 October 1959; 3 females, same collection data as preceding, but 17 July 1959; 1 female, same host, Chilibrillo River (Panamá), 27 August 1957; 8 females and 1 male same host, Fort Sherman (Canal Zone), 30 July 1959; 1 male, same host, Bocas del Toro, 22 January 1960; 4 males, 1 female, 2 deutonymphs and 3 protonymphs, from *Phyllostomus h. hastatus*, Heights of Guanapo, Trinidad, T. H. G. Aitken, 11 July 1957; 2 females, 1 male, 1 deutonymph and 2 protonymphs, same host and locality, W. G. Downs, 7 November 1956.

Holotype, allotype, 3 male, 2 female, 1 protonymph, 1 male and 1 female deutonymph paratypes in the United States National Museum; 2 paratypes (male and female) each in Chicago Natural History Museum and Trinidad Regional Virus Laboratory; remaining material in the collection of the author.

ADDITIONAL MATERIAL EXAMINED: Several collections from *Phyllostomus d. discolor* taken in Trinidad. From *Trachops cirrhosus* taken in Panama: Fort Sherman (Canal Zone), 1 female, C. M. Keenan and V. J. Tipton, 23 November 1959; Los Santos, V. J. Tipton, 2 females, 1 male, on 10 February 1962, 1 male from collection of 2 bats on 11 February 1962, 4 females, 2 males and 4 protonymphs from 7 bats on 14 February 1962, 6 females, 7 males, 5 male deutonymphs, 3 protonymphs from 4 bats on 21 February 1962. A single collection of 1 female from *Trachops cirrhosus* in Trinidad. A single collection of 1 female and a protonymph from *Myotis chiloensis*, Chiriquí Province, V. J. Tipton, 6 March 1962. Two collections of this mite have been seen from Colombia, from *Phyllostomus hastatus* (CNHM no. 88066) taken at La Macarena, Río Guapayá by Kjell von Sneidern, 14 March 1957, and from *Phyllostomus elongatus* (CNHM no. 88063) at Los Micos, San Juan de Arama, 21 February 1957, by the same collector.

REMARKS: *Periglischrus tiptoni* is a common parasite of bats of the genera *Phyllostomus* and *Trachops* in Panama and Trinidad, where it is often found in association with another new species, *Periglischrus inflatiseta*. It is named in honor of Lt. Col. Vernon J. Tipton, United States Army, who collected many of the spinturnicids recorded in this work.

***Periglischrus micronycteridis*, new species. Plate 45.**

Periglischrus micronycteridis is closely related to *P. tiptoni*, both species occurring on genera of Phyllostominae, although never encountered on the same genera. *P. micronycteridis* is a smaller species with stubby legs; female with the posterior seta of coxa III very small, the dorsal anterobasal seta of femur I very small to minute, and the sternal plate of engorged specimens roughly tongued-shaped. Males of *P. micronycteridis* differ from *P. tiptoni* in smaller size, short legs and lack of coarsely barbed, dorsal leg setae.

DESCRIPTION, FEMALE (pl. 45, figs. 1, 2): Gravid specimens broadly rounded anteriorly and posteriorly, with opisthosoma expanded; idiosoma approximately 970 μ long by 756 μ wide. Legs relatively short and stout.

Dorsum.—Dorsal plate similar to that of *Periglischrus tiptoni*, but anterior plate as broad as long (245 μ); posterior plate 108 μ long by 155 μ wide. Propodosomal setae 19–24 μ long, second pair longer than first pair; ratio of distance between bases of first pair to that between first and second pair varies from 4.6:1–7.8:1. Peritremes extend just anterior to level of second pair propodosomal setae. Unarmed opisthosoma with four pairs small setae. Posterior tip of anal plate extends dorsally, with minute postanal seta.

Venter.—Sternal plate longer (126 μ) than wide (87 μ); in engorged type specimen, plate narrowly tongue-like with eroded margins; three pairs small setae approximately 12 μ long located just off sclerotized margins of plate; two pairs circular pores on plate; very faint hyaline border extending beyond sclerotized margins includes bases first two pairs setae; in unengorged specimen sternal plate appears uniformly dense throughout area encompassed by hyaline border and sclerotized central area of engorged specimens. Pair metasternal setae subequal to sternals, posterolateral to sternal plate. Epigynial

platelet small, elongate, between coxae IV; preceded anteriorly by small, fan-shaped cuticular pattern; two minute setae lateral to platelet. Pattern of sclerotized opisthosomal areas similar to that of *Periglischrus tiptoni* on fed specimens; not visible in unengorged specimen. Opisthosomal setae as in *P. tiptoni*. Anal plate ventroterminal, elongate, widest posteriorly; adanal setae subequal to nearby ventral setae, 21 μ long, subterminal, arising anterior to anal opening which is terminal. Canal-like structures from adanal setae as in *P. tiptoni*.

Legs.—Short, stout; leg I exclusive of caruncles 350 μ long on type, ranging from 340–370 μ long on six representative specimens; posterior seta coxa II strong, minutely barbed, 110 μ long; others delicate and small; of latter, anterior seta of coxa III usually longest, 24 μ ; ventral and dorsal setation of other segments similar to that in *P. tiptoni*, but with somewhat shorter setae and with dorsal, anterobasal seta of femur I very small (9 μ).

Gnathosoma.—As described for *P. tiptoni* but with medial lobe of palpal tibia less pronounced.

MALE (pl. 45, figs. 3, 4): A small mite for the genus, with stubby legs. Idiosoma ovoid, widest at level of coxae II–III; 421 μ long by 335 μ wide.

Dorsum.—Shape and alveolar pattern of dorsal plates as in *Periglischrus tiptoni*; anterior plate 237 μ long on mid-line by 255 μ wide; posterior plate 128 μ long by 160 μ wide; plates covering most of idiosoma. Propodosomal setae relatively short, measuring 38 μ or slightly less in allotype; ratio of distance between first pair setal bases to that between first and second pairs approximately 4.7:1. Unarmed opisthosoma bearing one pair small posterolateral setae in addition to smaller postanal seta. Peritremes normal for genus, extending almost to bases of second pair propodosomal setae.

Venter.—Sternal plate similar to that of *P. tiptoni* but setae relatively shorter, not overlapping bases of more posteriorly located setae of plate. Pair of reduced but not minute setae, 12 μ long, behind sternal plate. Six larger pairs setae in addition to subequal adanal pair in space between coxae IV; anal plate and setal pattern as in *P. tiptoni*.

Legs.—Relatively short; leg I 394 μ long exclusive of ambulacrum. Posterior seta of coxa II long (110 μ), minutely fimbriated, three times as long as next longest coxal setae, which are acicular. Ventral setae of other segments mostly relatively short and acicular; tarsi I and II each with one and III and IV each with three short, sharp, spini-form setae. Dorsal setae of legs with longer setae very minutely barbed, superficially appearing nude; shorter setae nude, or at most some minutely barbed; femora II, III and IV each with one minute seta in addition to larger setae.

Gnathosoma.—As described for *P. tiptoni* except that gnathosomal and distal hypostomal setae lengths are 16 μ and the lateral seta of palpal tibia is nude.

FEMALE DEUTONYMPH: Very similar to female deutonymph of *P. tiptoni* from which it differs as follows: a smaller mite with idiosoma approximately 430 μ long; legs short, stubby; leg I 430 μ long exclusive of ambulacrum; leg setae essentially nude, some with very minute barbs; posterior seta of coxa II relatively long (100 μ).

TYPE MATERIAL: Holotype female (host no. 7959) and 5 paratype females collected by R. L. Wenzel and C. M. Keenan from *Micronycteris megalotis microtis* near Borinquen Highway (Canal Zone), 24 October 1961. Allotype male (host no. 10010) with 2 male, 1 female and 1 female deutonymph paratypes collected by V. J. Tipton from *Micronycteris minuta*, Guánico (Los Santos), 24 February 1962. Other paratypes from *Micronycteris megalotis microtis*: 5 females, Borinquen Highway (Canal Zone), 24 October 1961 and 2 females, Cocoli (Canal Zone), 24 October 1961, R. L. Wenzel and C. M. Keenan; 4 females, Chiriquí Province, 6 March 1962, V. J. Tipton; 6 females, same data but 2 March 1962. Paratypes from Trinidad from *Micronycteris m. megalotis*: 7 females, Cocorite, West Port-of-Spain, 24 June 1958, and 9 females, Quinam Road, Siparia, 13 March 1959, T. H. G. Aitken.

Holotype, allotype, and 4 female paratypes in the United States National Museum; 2 female paratypes, Chicago Natural History Museum; 3 female paratypes, Trinidad Regional Virus Laboratory; remaining material in the collection of the author.

A single male from *Micronycteris megalotis microtis*, Barro Colorado Island (Canal Zone), collected by C. M. Keenan and V. J. Tipton, 12 January 1960, is doubtfully identified as *P. micronycteridis*. It appears abnormal in several minor characteristics.

REMARKS: *P. micronycteridis* specimens from different hosts and of different degrees of engorgement exhibit minor differences in morphology which are interpreted as intraspecific variation. Specimens from Trinidad bats have a short fine seta on the anterior margin of coxa III as well as II, while on all other specimens these are represented by longer, delicate setae. The single female associated with males is an unfed specimen with unexpanded idiosoma. On it, the characteristic shape of the sternal plate seen in engorged females appears quite different, with convex lateral margins instead of the roughly tongue-shaped structure illustrated here. However, in engorged specimens an almost transparent marginal area of the plate appears to represent the actual margins as seen in the unfed specimen.

Periglischrus species

A single female specimen designated species "D" represents a possible new species related to *Periglischrus desmodi*. It was collected by C. M. Keenan and V. J. Tipton from *Pteronotus parnellii fuscus*, Bocas del Toro Province, 1 February 1960. According to Goodwin and Greenhall (1961), this host is known to roost in caves with *Desmodus rotundus*, the common host of *Periglischrus desmodi*. It seems probable that the single specimen of species "D" recorded here may represent a slightly atypical specimen of *Periglischrus desmodi* which strayed from its normal host. It differs from typical *P. desmodi* in having shorter dorsal propodosomal setae measuring up to 51 μ long; in having shorter dorsal opisthosomal setae, and in having the scimitar-shaped posterior setae of leg IV inflated as in *Periglischrus caligus*.

A collection of two females, three males and three nymphs is designated as an undetermined *Periglischrus* species "K." It was taken from *Lonchophylla robusta* at Chilibrillo Caves (Panamá) by C. M. Keenan and V. J. Tipton, 20 August 1959. Species "K" probably represents a new species closely related to *P. desmodi*, but it is left undescribed here pending collection of additional specimens to settle the question of intraspecific variation. Females differ from *P. desmodi* in having a more angular sternal plate, shorter dorsal propodosomal setae and inflated, scimitar-like posteroventral setae on leg IV. Males possess only one pair of dorsal opisthosomal setae, shorter sternal plate setae and a small idiosoma about 378 μ long.

A single female designated species "G" was taken from *Macrophyllum macrophyllum* at natural bridge, Madden Dam (Canal Zone), by C. M. Keenan and V. J. Tipton, 31 July 1959. This undoubtedly will prove to be a new species, but since there is only a single, damaged specimen at hand, its

description awaits further collection. In the key it comes out at couplet 5, but fits neither half of the couplet. Its outstanding characteristic is the possession of an expanded, pilidiform seta on the anterior margin of coxa III, a character possessed by no described species of the genus.

Genus *Spinturnix* von Heyden

Spinturnix von Heyden, 1826, Isis (Oken), 18, (6), p. 612. Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2) p. 200.

Type-species: *Pteroptus myoti* Kolenati, 1856, designated by Opinion 128 of the International Commission on Zoological Nomenclature (1936).

Spinturnix species differ from all other genera of the family in that the peritremes are short, dorsal over coxae III, with the anterior end bending ventrad, usually reaching the ventral surface between coxae II and III. They have a single dorsal plate. The tritosternum may be present or absent. Legs I and claws of female are not unusually enlarged; caruncles are large. All males seen by the author lack the two long, bluntly-tipped setae of tarsus I characteristic of *Periglischrus*.

The various instars of immature *Spinturnix* species seen by the author may be determined as follows: The female deutonymph lacks the epigynial plate but has dorsal opisthosomal setation similar to that of the adult female. The male deutonymph resembles the female deutonymph but has dorsal opisthosomal setation similar to that of the adult male. The protonymph has stigmata smaller in diameter than the width of the peritremes, in contrast to subsequent instars, and has fewer ventral setae between the sternal and anal plates than in deutonymphs.

Spinturnix americanus (Banks)

Pteroptus americanus Banks, 1902, Can. Ent., 34, (7), p. 173, fig. 6—Museum of Comparative Zoology, Harvard (Type locality a cave in Indiana, from "bat," probably *Myotis lucifugus lucifugus*).

Spinturnix americanus Banks, 1915, Rept. U.S. Dept. Agric., no. 108, p. 72, figs. 137, 138. Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 218, pls. 39, 40.

Spinturnix carloshoffmanni Hoffmann, 1944, Ann. Inst. Biol. Univ. Nac. Mexico, 15, (1), p. 185, figs. 1-5—United States National Museum, Washington (Cerro del Xitle, Tlalpan, Mexico, D.F., from *Natalus mexicanus mexicanus*). Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 222. *New synonymy*.

DIAGNOSIS: General appearance typical of genus. Tritosternum present, but small. Unarmed opisthosoma of female with 10-25 long dorsal, dorso-terminal and ventroterminal setae, those near posterior body margin longer than others. Legs of both sexes with ventral and ventrolateral setae mostly short; the pair of proximal dorsal setae of femora I and II are tiny and the proximal dorsal seta on each of femur III and IV is tiny. Males with two pairs of long opisthosomal setae on unarmed cuticula near posterior apex of dorsal shield.

PANAMANIAN MATERIAL EXAMINED: From *Myotis n. nigricans* the following collections were made by C. M. Keenan and V. J. Tipton. Fort Davis (Canal Zone), 1 female, 7 January 1960; Fort Clayton (Canal Zone), 1 female, 30 January 1960; and 6 females, 13 September 1960; Gamboa (Canal

Zone), 1 female, 1 female deutonymph and 2 protonymphs, 23 September 1960; Frijoles (Canal Zone), 2 females, 2 males, 28 March 1960; Barro Colorado Island (Canal Zone), 28 females, 20 males, 2 female deutonymphs, 2 male deutonymphs, 2 protonymphs, 12 June 1960; Bocas del Toro Province, 1 female, 23 January 1960; Juan Mina (Canal Zone), 11 females, 2 males, 1 female deutonymph, 1 male deutonymph, 2 protonymphs, 28 July 1960; cave at Finca Lara (Chiriquí), two collections of 1 male and of 1 female deutonymph, 3 May 1961. From *Myotis n. nigricans* or *Myotis chiloensis* at cave, Finca Lara (Chiriquí), 35 male, 2 female deutonymphs, 6 male deutonymphs, 28 protonymphs, C. M. Keenan and V. J. Tipton, 5 May 1961. From *Myotis n. nigricans* in Chiriquí Province, 1 male and 2 protonymphs, V. J. Tipton, 7 March 1962. From *Myotis albescens* in Bocas del Toro Province, 1 male, C. M. Keenan and V. J. Tipton, 25 February 1960. From *Myotis chiloensis*, Chiriquí Province, 1 male, 2 male deutonymphs, 6 protonymphs, V. J. Tipton, 7 March 1962. From *Myotis simus* at Cerro Punta (Chiriquí), 1 male, V. J. Tipton, 3 May 1960; 1 male, C. M. Keenan and V. J. Tipton, 3 May 1961; and 1 male, C. M. Keenan and V. J. Tipton, 5 May 1961.

REMARKS: Panamanian specimens of *Spinturnix americanus* show considerable variation in characters previously used to differentiate *S. americanus* and *S. carloshoffmanni*. The majority, which I designate as population "B", lacks a long posterolateral seta on tibia III and IV but has such a seta on patella III and IV. Associated with this is the presence of 10–12 long, subterminal and dorsal setae on the opisthosoma. Others, designated as population "A", have a long posterolateral seta on patella and tibia IV and on patella III associated with the presence of 18–24 long, subterminal and dorsal setae on the opisthosoma. Populations of both kinds occur on the same host species and in one collection both kinds were found on the same host specimen.

Rudnick (1960) also noted variation in the above characteristics. In view of the demonstrated variability of the criteria used for distinction of *S. americanus* and *S. carloshoffmanni* and the presence of such variation in series from a single host the latter species is considered a synonym.

Spinturnix subacuminatus, new species. Plate 46.

This species belongs to group III of Rudnick (1960), characterized by long lateroventral leg setae and lack of tiny dorsal setae on femora. It is related to *Spinturnix acuminatus* (C. L. Koch), from which females differ in possessing 28–33 dorsal opisthosomal setae, of which the posterior 6–9 are much the largest, by a broadly pentagonal tritosternum and by relatively well-developed ventral idiosomal setae. Males differ from *S. acuminatus* in possessing only one pair of dorsal opisthosomal setae, a tritosternum with a straight posterior border and well rounded anterior margin, and ventral idiosomal setae relatively well developed.

DESCRIPTION, FEMALE (pl. 46, figs. 1, 2): Idiosoma ovoid, approximately 1000 μ long by 730 μ wide.

Dorsum.—Dorsal plate ovoid, 570 μ long by 405 μ wide; with 11 pairs dorsal alveoli,

some bearing minute setae; several irregular pore-like structures near posterior margin. Five pairs moderately long propodosomal setae surrounding dorsal plate anterior to peritremes, and spaced increasingly far apart proceeding posteriorly. Peritremes dorsal over coxae III, bending ventrad between coxae II and III. Metapodosomal setae subequal to propodosomals, inserted medial to posterior borders of stigmata. Twenty-eight to 33 opisthosomal setae of which subterminal six to nine are much larger; others subequal to propodosomal setae.

Venter.—Tritosternum roughly pentagonal, broader than long, with posterior margin broadly V-shaped. Sternal plate broadly jug-shaped, about as broad as long, broadly rounded posteriorly, with lateral margins converging anterior to second pair of setae; anterior margin bluntly rounded; three pairs setae approximately $36\ \mu$ long, partially imbedded on plate margins; surface of plate lightly reticulated; two pairs of pores. Pair metasternal setae on unarmed cuticula posterolaterad of sternal plate, subequal to sternals. Epigynial plate small; broadly rounded subcircular anterior portion lightly sclerotized; posterior lobe narrowly rectangular, with pair genital setae on posterior margin subequal to sternals. Pair small sclerotized bars lateral to epigynial plate. Twenty to 22 small ventral setae between epigynial and anal plates; submedian anterior pair minute. Anal plate small, subterminal, incompletely ovoid, longer than wide, with anterior heavily sclerotized arc bearing pair adanal setae at lateral ends of arc; postanal seta $18\ \mu$ long, subequal to adanals.

Legs.—Lateroventral setae mostly long; other ventral setae mostly medium length with few short setae. Dorsal setae mostly very long. No minute dorsal setae on femora. Posterior seta of coxa II $215\ \mu$ long, over two and one-half times longer than other coxal setae.

Gnathosoma.—Tectum a short rounded lobe. Gnathosomal setae slightly larger than distal hypostomal pair; other hypostomal setae lacking. Palpal tarsus with inner basal, blunt, stout, prominent spine. Chelicerae normal for genus.

MALE (pl. 46, figs. 3, 4): Idiosoma ovoid, $853\ \mu$ long by $641\ \mu$ wide.

Dorsum.—Similar to female with following differences: metapodosomal setae well posterior to stigmata, and only one pair posteriorly placed opisthosomal setae on unarmed integument; dorsal plate $730\ \mu$ long by $459\ \mu$ wide, lacking irregular pore-like structures near posterior margin.

Venter.—Tritosternum a lightly sclerotized small platelet with straight posterior margin and broadly rounded anterolateral margins, broader than long. Sternal plate lightly sclerotized, with reticular surface pattern; longer than wide, widest at level of second pair setae, tapering to width of genital opening anteriorly, and to rounded extremity posteriorly, with three pairs small marginal setae. Metasternal setae laterad of posterior tip of sternal plate. Pair small sclerotized, submedian bars posterior to sternal plate. Five pairs small, simple setae between posterior tip of sternal plate and anal plate. Anal plate similar to that of female.

Legs.—As in female.

Gnathosoma.—As described for female but with spermatophoral process a stout, recurved tubular structure approximately $96\ \mu$ long, tapered to blunt tip; basal spine of palpal tarsus very blunt and broad throughout.

TYPE MATERIAL: Holotype female (host no. 5536) from *Rhogeessa tumida*, taken in Bocas del Toro Province, by C. M. Keenan and V. J. Tipton, 9 February 1960. Allotype male (host no. 3925) from *R. tumida*, Fort Kobbe Beach (Canal Zone), C. M. Keenan and V. J. Tipton, 27 July 1959. Paratypes as follows: 9 females, 6 males, 3 deutonymphs and 2 protonymphs, same data as allotype; 3 females, 4 males and 1 deutonymph, same data as allotype but collected 16 November 1959. Holotype, allotype, and 2 paratypes, male and female, in the United States National Museum; 2 paratypes, male and female, Chicago Natural History Museum; remaining material in the collection of the author.

Spinturnix species

A single female specimen from *Myotis n. nigricans* taken by C. M. Keenan and V. J. Tipton at Building 519, Fort Clayton (Canal Zone), 22 May 1961. It closely resembles *Spinturnix subacuminatus*, but is distinguished by a broadly rounded sternal plate which is wider than long, by the apparent absence of a tritosternum, and by other minor differences. It probably represents a new species, but its description awaits collection of further material.

Genus Paraspinturnix Rudnick

Paraspinturnix Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 231.

Type-species: *Paraspinturnix globosus* Rudnick, 1960.

The description of this monotypical genus as given by Rudnick (1960) fits the specimens recorded from Panama with the exception that the idiosoma is typically spinturnicid-shaped instead of globose.

Paraspinturnix globosus Rudnick

Paraspinturnix globosus Rudnick, 1960, Univ. Calif. Publ. Ent., 17, (2), p. 231, pl. 48, figs. 1, 2—United States National Museum, Washington (Nickajack Cave, Marion County, Tennessee, from *Myotis sodalis*).

Female specimens from Panama identified as this species agree in all but a few minor respects with the description and figures given by Rudnick (1960). The idiosoma has the characteristic *Spinturnix* shape attributed by Rudnick (loc. cit.) to newly emerged, non-gravid females. No circular areas of heavy sclerotization appear on the shoulders of the dorsal plate. The metapodosomal pair of dorsal setae arise just medial to the stigmata.

A single collection of three females is designated as this species from a bat identified as *Myotis n. nigricans* or *Myotis chiloensis*, from a cave at Finca Lara (Chiriquí), C. M. Keenan and V. J. Tipton, 5 May 1961. From the same bat were collected numerous specimens of *Spinturnix americanus*.

Abstract

Thirteen species in three genera of spinturnicid mites are recorded for the first time from Panama. Descriptions are given of seven new species of *Periglischrus* recorded from both Panama and Trinidad, and one new species of *Spinturnix* recorded from Panama. The new species and type hosts are *P. natali* from *Natalus stramineus mexicanus*, *P. elongatus* from *Pteronotus parnellii fuscus*, *P. inflatiseta* from *Phyllostomus hastatus*, *P. aitkeni* from *Sturnira lilium lilium*, *P. desmodi* from *Desmodus rotundus rotundus*, *P. tiptoni* from *Phyllostomus hastatus*, *P. micronycteridis* from *Micronycteris megalotis*, and *Spinturnix subacuminatus* from *Rhogeessa tumida*. *Periglischrus caligus* Kolenati is redescribed. *Spinturnix carloshoffmanni* Hoffman is synonymized under *Spinturnix americanus* (Banks).

The spinturnicid genus *Periglischrus* occurs primarily on bats of the family Phyllostomidae. *Periglischrus* species are not uncommon on members of the related family Desmodidae, and one atypical species occurs only on bats of the family Natalidae of a different superfamily from the other bat hosts. With few exceptions, the primary hosts of a given *Periglischrus* species are limited to members of a single bat genus or to members of closely related genera. One exceptional species, *P. iheringi*, occurs on seven genera of Stenoderminae of the Phyllostomidae as well as on a genus of Desmodidae. *Spinturnix* species and *Paraspinturnix* are primarily limited to bats of the family Vespertilionidae. The primary hosts of each species of these two genera recorded from Panama are limited in each instance to host species of a single genus.

HOST-PARASITE LIST

- Order CHIROPTERA
 Superfamily Emballonuroidea
 Family Noctilionidae
Noctilio leporinus
Periglischrus aitkeni n. sp.
- Superfamily Phyllostomoidea
 Family Phyllostomidae
 Subfamily Chilonycterinae
Pteronotus parnellii
Periglischrus species "D"
 " *elongatus* n. sp.
- Pteronotus suapurensis**
Periglischrus elongatus n. sp.
- Subfamily Phyllostominae
Micronycteris megalotis
Periglischrus micronycteridis n. sp.
- Micronycteris minuta**
Periglischrus micronycteridis n. sp.
- Macrophyllum macrophyllum**
Periglischrus species "G"
- Phyllostomus hastatus**
Periglischrus tiptoni n. sp.
 " *inflatseta* n. sp.
- Trachops cirrhosus**
Periglischrus tiptoni n. sp.
 " *vargasi* Hoffmann
- Subfamily Glossophaginae
Glossophaga soricina
Periglischrus caligus Kolenati
- Lonchophylla robusta**
Periglischrus species "K"
- Anoura cultrata**
Periglischrus vargasi Hoffmann
- Anoura geoffroyi**
Periglischrus vargasi Hoffmann
- Subfamily Carolliinae
Carollia perspicillata
Periglischrus sp.
- Subfamily Sturnirinae
Sturnira lilium
Periglischrus aitkeni n. sp.
- Sturnira ludovici**
Periglischrus aitkeni n. sp.
- Sturnira** sp.
Periglischrus aitkeni n. sp.
- Subfamily Stenoderminae
Uroderma bilobatum
Periglischrus iheringi Oudemans
- Vampyrops helleri**
Periglischrus iheringi Oudemans
- Vampyrops vittatus**
Periglischrus iheringi Oudemans
- Vampyroides caraccioli**
Periglischrus iheringi Oudemans
- Vampyressa pusilla**
Periglischrus iheringi Oudemans
- Chiroderma salvini**
Periglischrus iheringi Oudemans
- Artibeus cinereus**
Periglischrus iheringi Oudemans
- Artibeus jamaicensis**
Periglischrus iheringi Oudemans
- Artibeus lituratus**
Periglischrus iheringi Oudemans
- Enchisthenes hartii**
Periglischrus iheringi Oudemans
- Family Desmodidae
Desmodus rotundus
Periglischrus iheringi Oudemans
 " *desmodi* n. sp.
- Superfamily Vespertilionoidea
 Family Natalidae
Natalus stramineus
Periglischrus natali n. sp.
- Family Vespertilionidae
 Subfamily Vespertilioninae
Myotis albescens
Spinturnix americanus (Banks)
- Myotis chiloensis**
Periglischrus tiptoni n. sp.
Spinturnix americanus (Banks)
- Myotis nigricans**
Spinturnix americanus (Banks)
 " sp.
- Myotis nigricans** or **Myotis chiloensis**
Spinturnix americanus (Banks)
Paraspinturnix globosus Rudnick
- Myotis simus**
Spinturnix americanus (Banks)
- Rhogeessa tumida**
Spinturnix subacuminatus n. sp.
- Family Molossidae
Tadarida brasiliensis
Spinturnix sp.

References

BANKS, N.

1902. New genera and species of Acariens. *Can. Ent.*, 34, (7), pp. 171-176, fig. 6.
1915. The Acarina or mites, a review of the group for the use of economic entomologists. Rept. U. S. Dept. of Agric., no. 108. 153 pp., 294 figs.

GOODWIN, G. G., AND GREENHALL, A. M.

1961. A review of the bats of Trinidad and Tobago. *Bull. Amer. Mus. Nat. Hist.*, 122, (3), pp. 187-302, pls. 7-46.

HEYDEN, C. H. G. VON

1826. Versuch einer systematischen Eintheilung der Acariden. *Isis (Oken)*, 18, (6), pp. 608-613.

HOFFMANN, A. M.

- 1944a. *Periglischrus vargasi* n. sp. (Acarina: Parasitidae). *Rev. Inst. Salub. Enferm. Trop., Mexico*, 5, (2), pp. 91-96, 2 text figs.
1944b. Un nuevo acaro parasito de murcielagos. *An. Inst. Biol., Univ. Nac. Mexico*, 15, (1), pp. 185-189, 5 text figs.

KOLENATI, F. A.

1857. Synopsis prodroma der Flughaut-Milben (Pteroptida) der Fledermäuse. *Wien. Ent. Monatschr.*, 1, (2), pp. 59-61.

OUDEMANS, A. C.

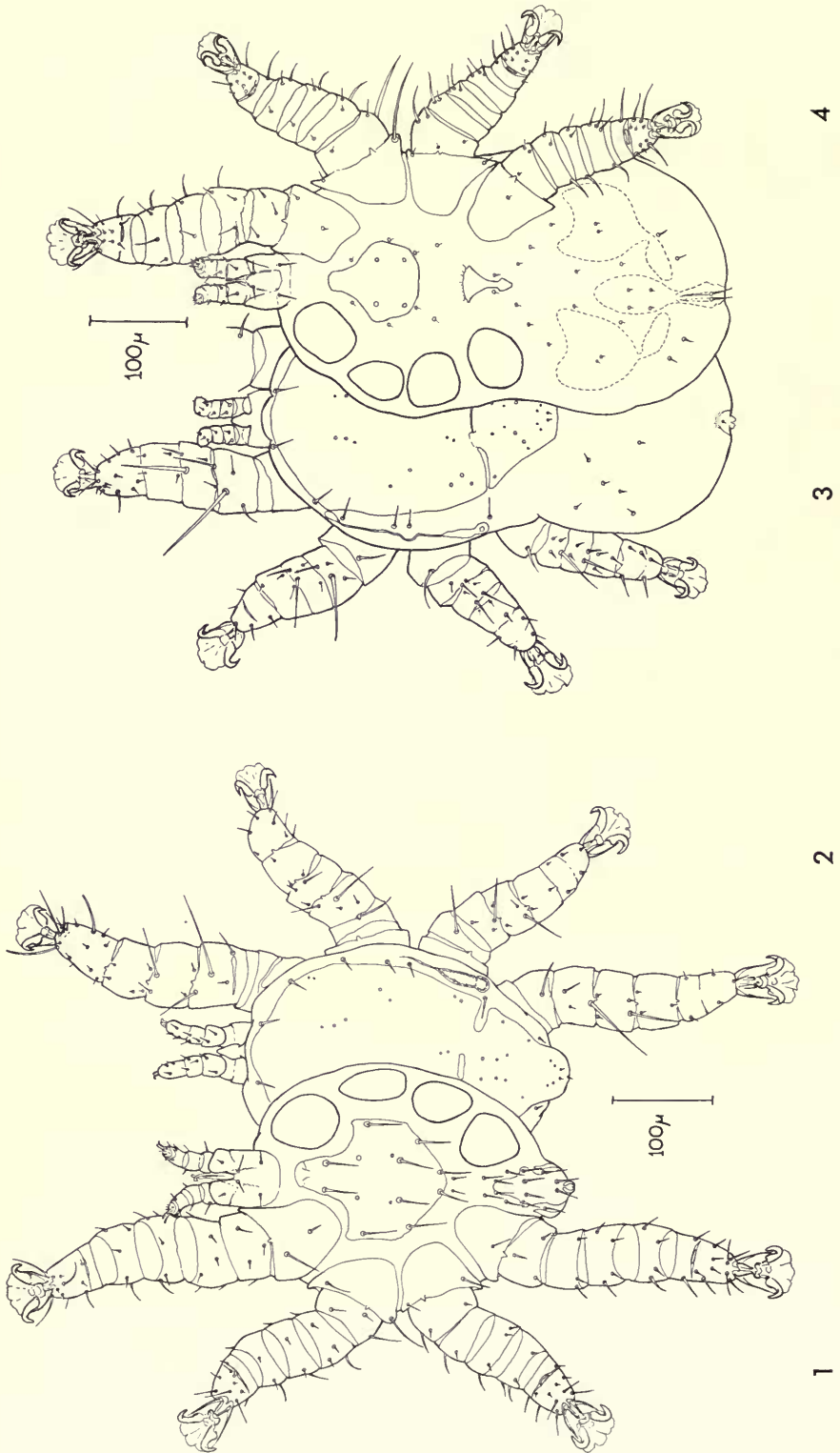
1902. Acarologische aantekeningen. *Ent. Ber.*, 1, (6), pp. 36-39.
1903. Notes on Acari. Fifth series. *Tijdschr. Ent.*, 45: 123-150, pls. 10-12.

RUDNICK, A.

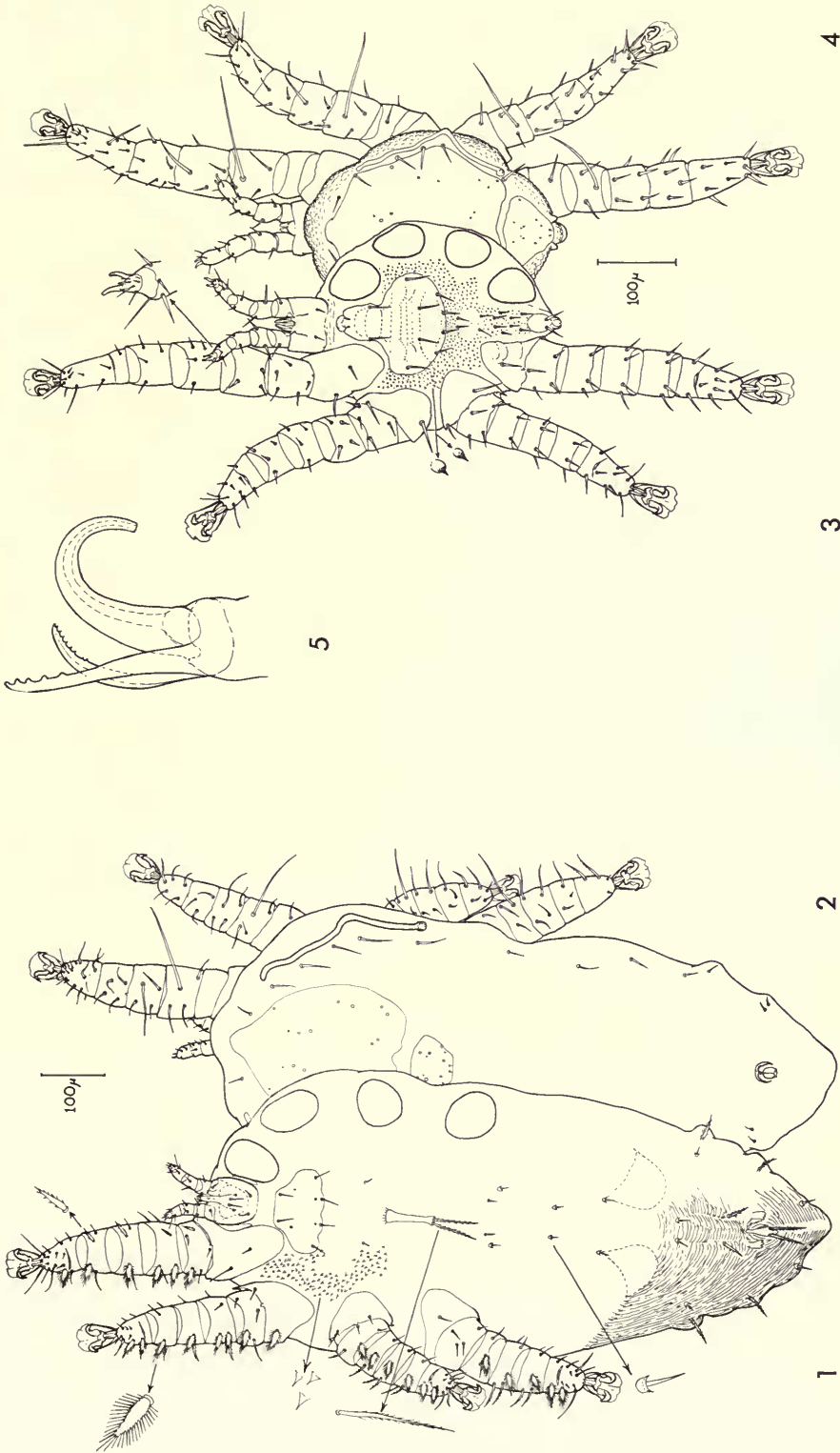
1960. A revision of the mites of the family Spinturnicidae (Acarina). *Univ. Calif. Publ. Ent.*, 17, (2), pp. 157-284, pls. 18-48.

TIBBETTS, T.

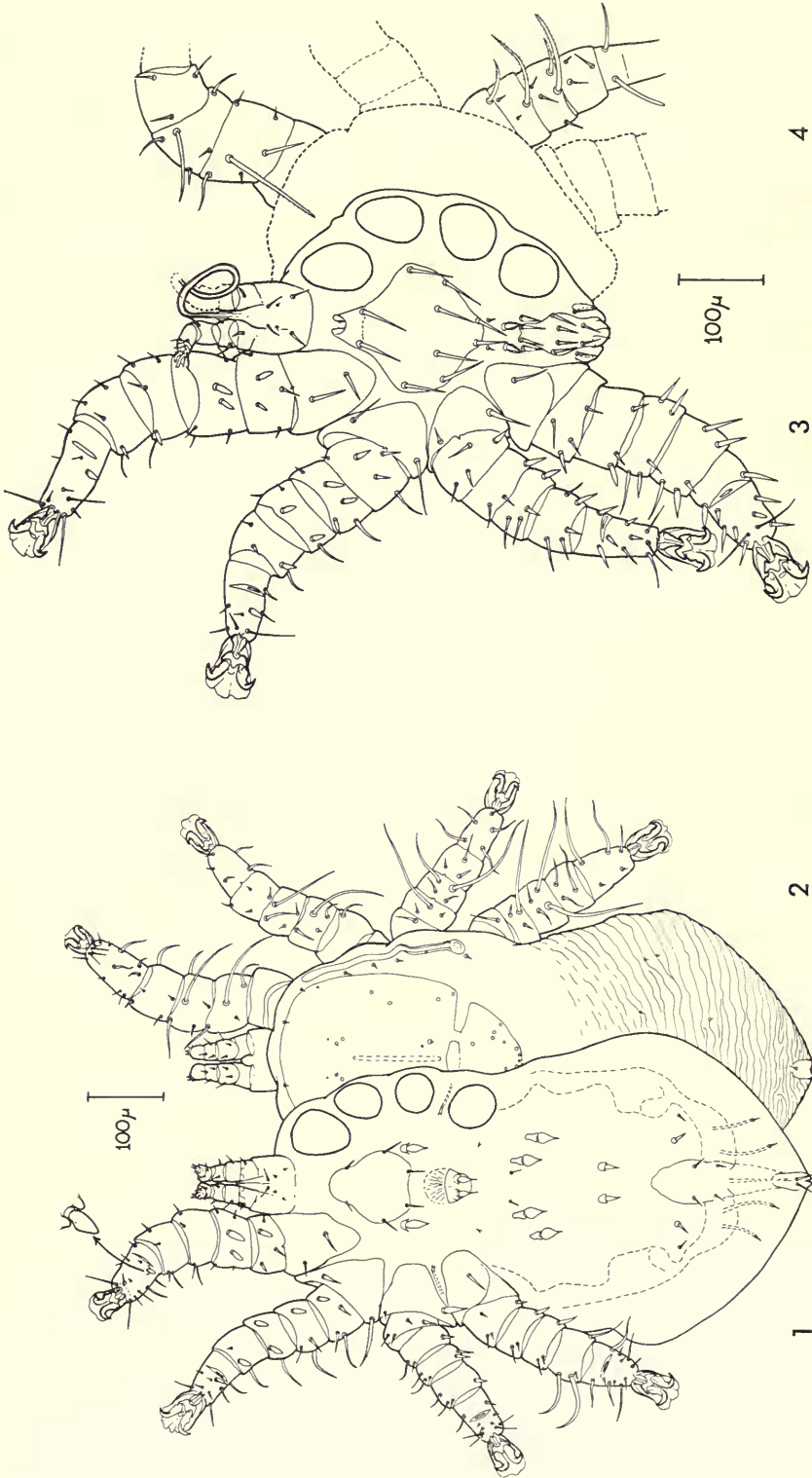
1957. Description of a new *Periglischrus* from a bat, *Mormoops megalophylla senicula* Rehn, together with a key to the species of *Periglischrus* (Acarina, Spinturnicidae). *Jour. Kansas Ent. Soc.*, 30, (1), pp. 13-19.



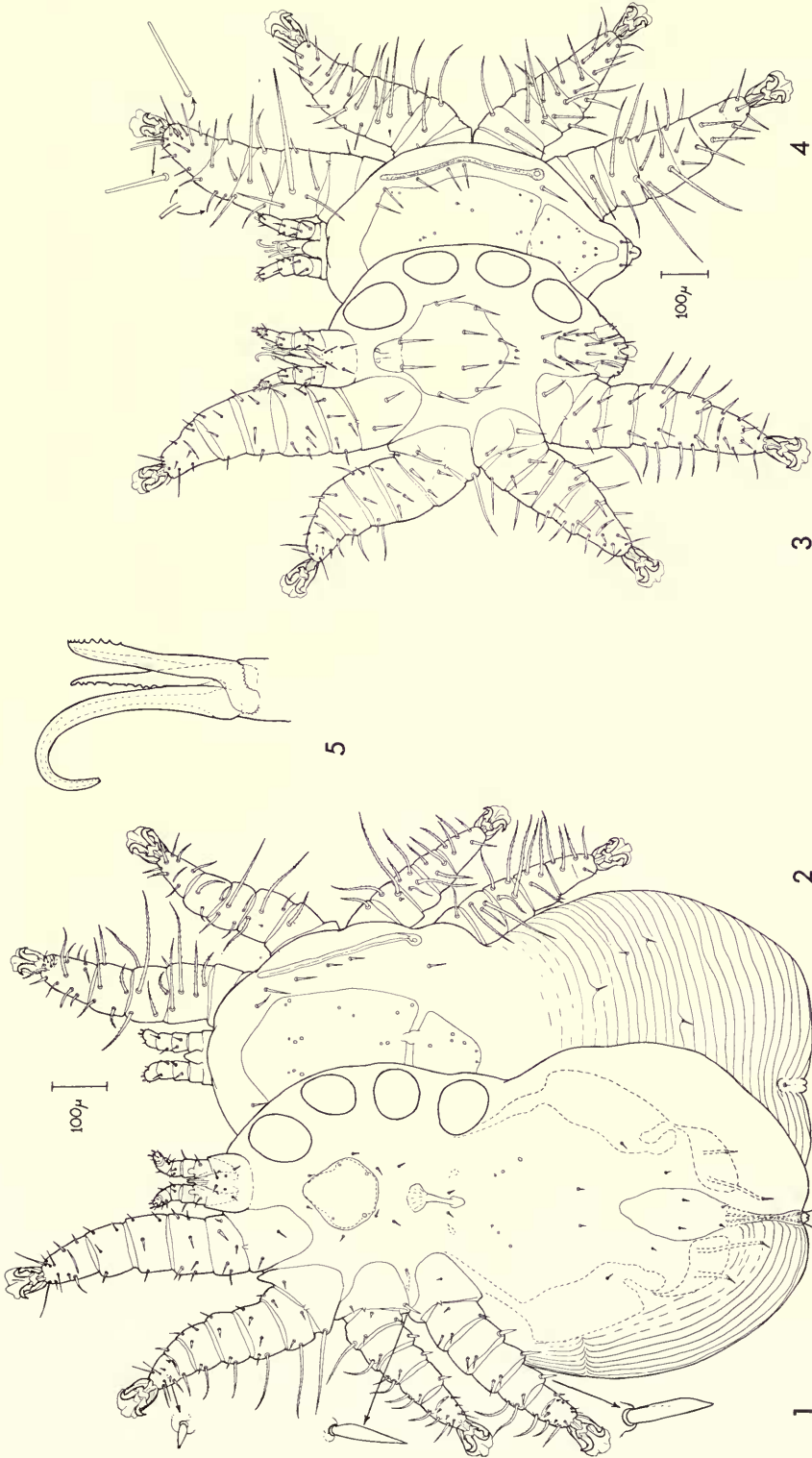
Periglyphus natali, new species. 1, dorsum and 2, venter of female. 3, venter and 4, dorsum of male.



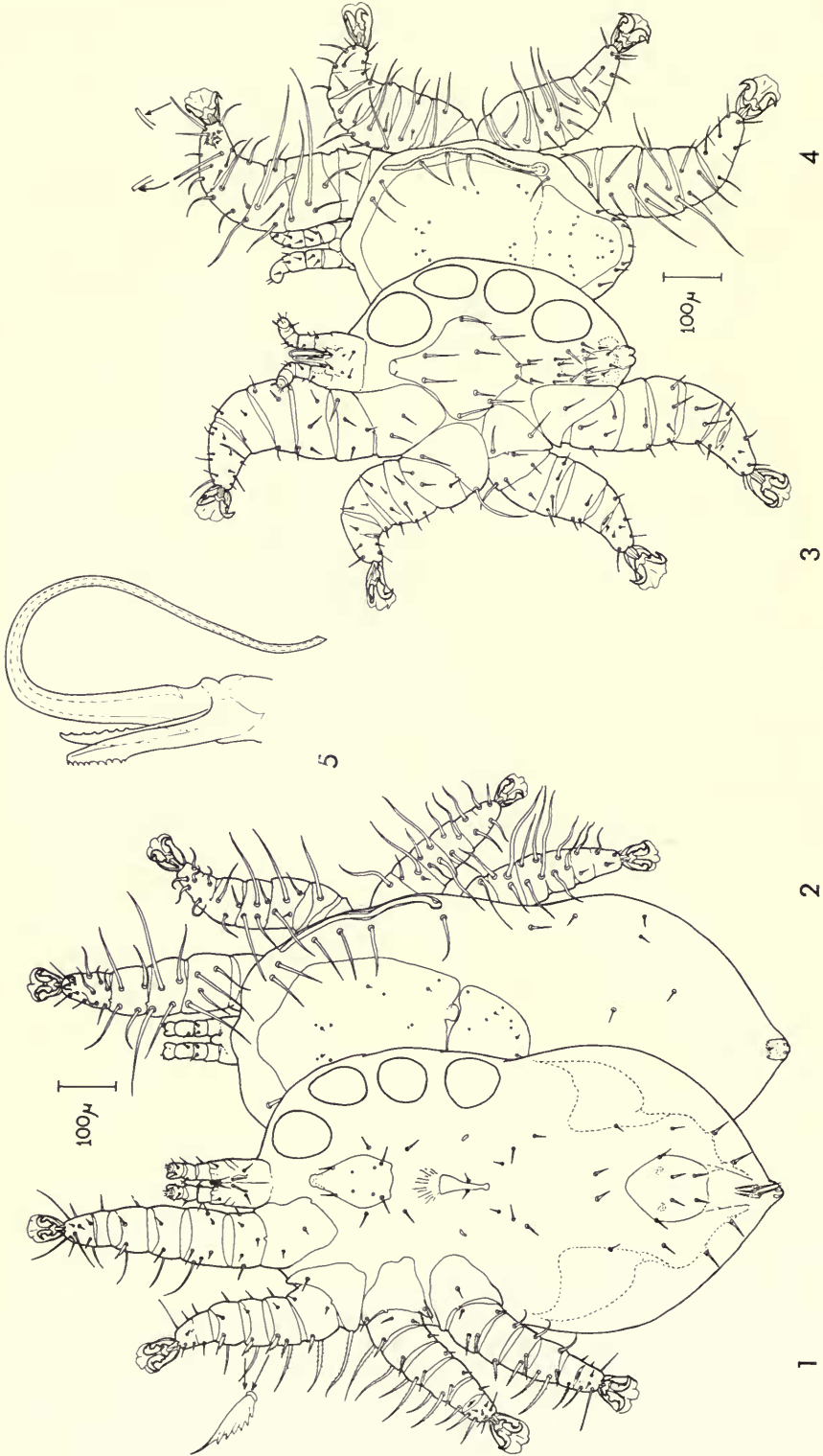
Periglischrus elongatus, new species. 1, venter and 2, dorsum of female. 3, venter, 4, dorsum and 5, chelicera of male.



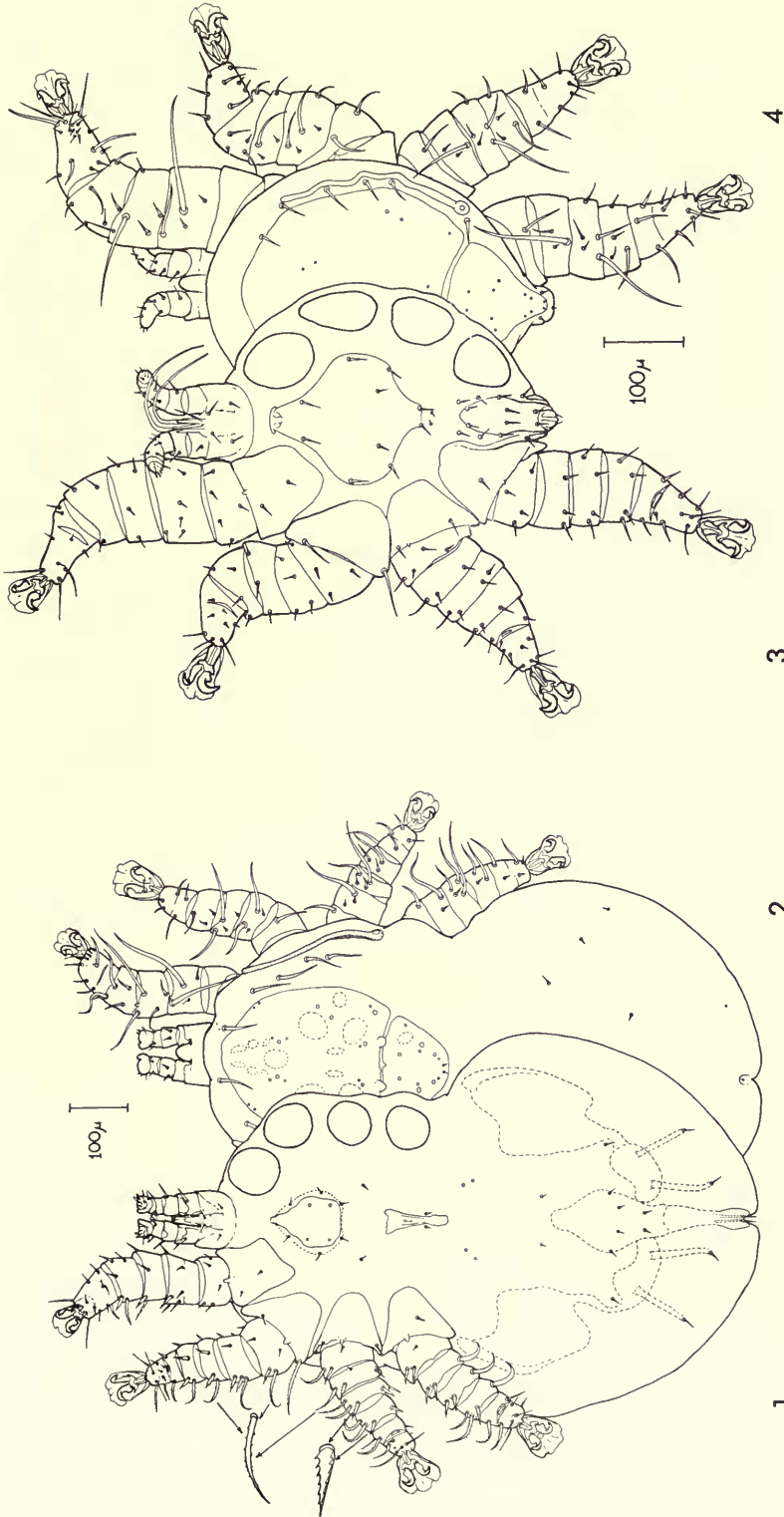
Periglischnus inflatseta, new species. 1. venter and 2. dorsum of female. 3, venter, and 4, dorsum of male.



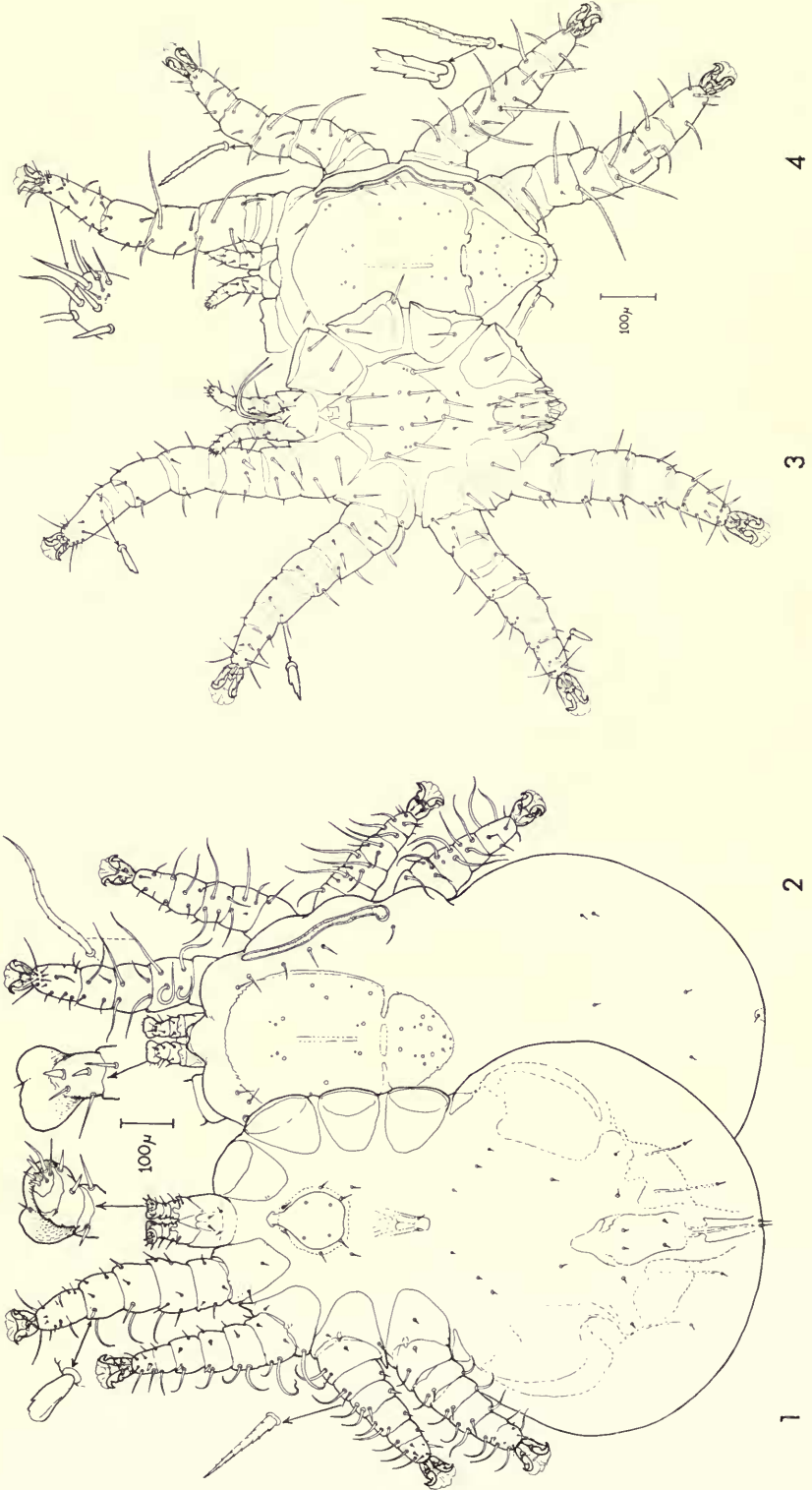
Periglischrus aitkeni, new species. 1, venter and 2, dorsum of female. 3, venter, 4, dorsum, and 5, chelicera of male.



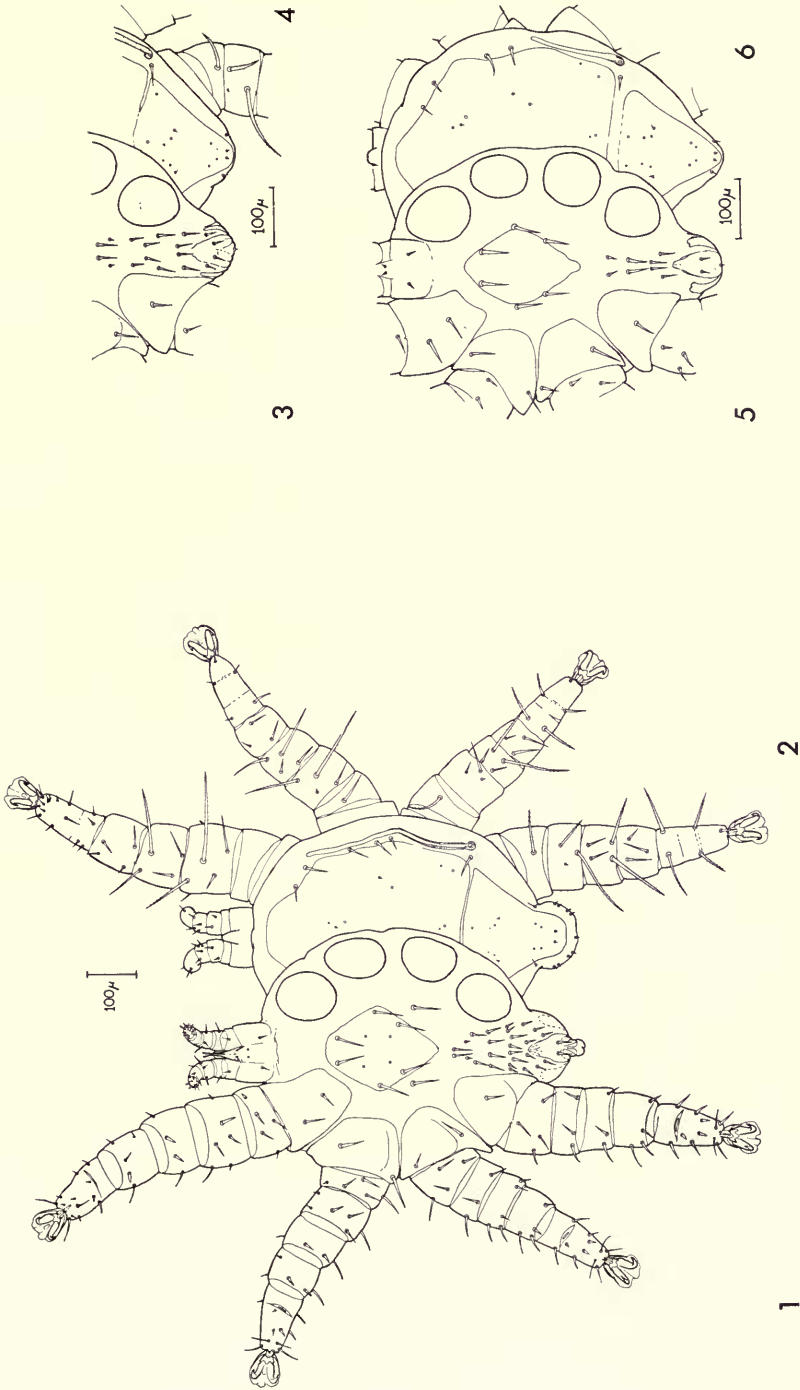
Periglischrus desmodi, new species. 1, venter and 2, dorsum of female. 3, venter, 4, dorsum, and 5, chelicera of male.



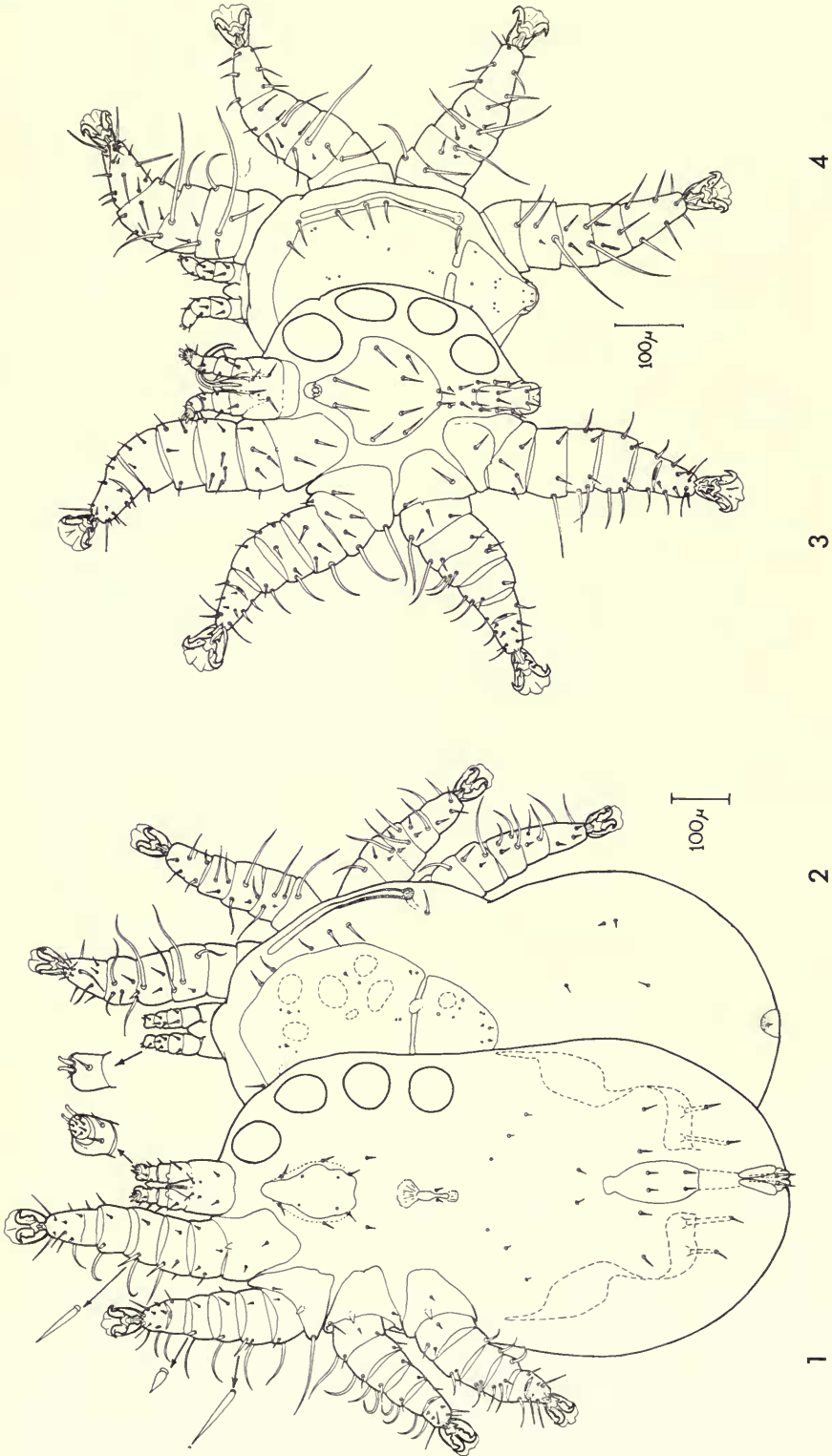
Periglischnus caligus Kolenati. 1, venter and 2, dorsum of female. 3, venter and 4, dorsum of male.



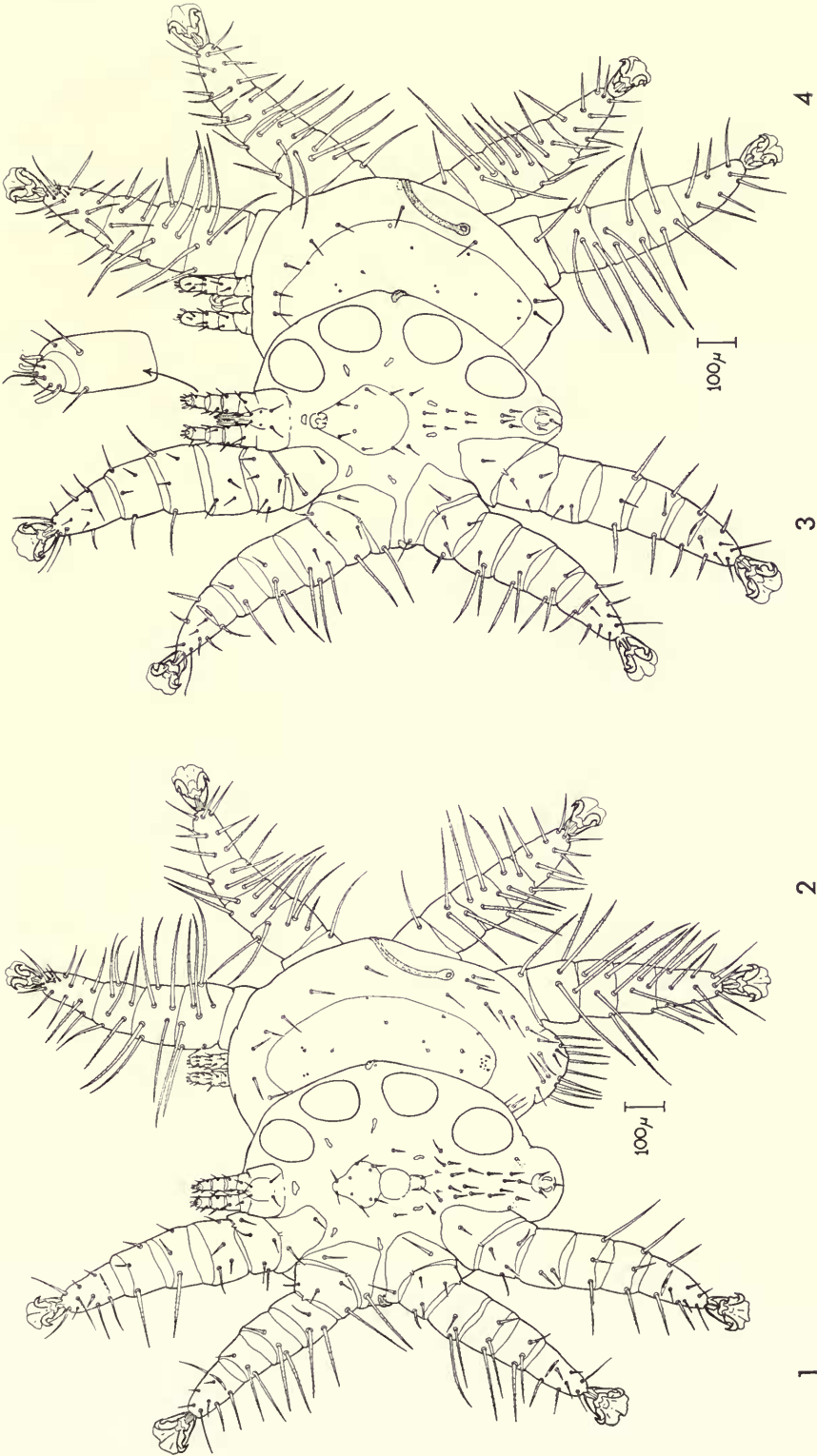
Periglischrus tiptoni, new species. 1, venter and 2, dorsum of female. 3, venter and 4, dorsum of male.



Periglischrus tiptoni, new species. 1, venter and 2, dorsum of female deutonymph. 3, posterior venter and 4, posterior venter of male deutonymph. 5, venter and 6, dorsum of protonymph.



Periglischrus micronycteridis, new species. 1, venter and 2, dorsum of female. 3, venter and 4, dorsum of male.



Spinturnix subacuminatus, new species. 1, venter and 2, dorsum of female. 3, venter and 4, dorsum of male.

Addendum

Since submission of the manuscript for this paper in 1962, a series of spinturnicids have been described by Machado-Allison. In 1965 (*Acta Biologica Venezuelica*, 4, (10), pp. 243-258) he described a new genus and species, *Cameronieta thomasi* from *Chilonycteris rubiginosa fusca*. His figure and description of the female agree with the specimens I have described as heteromorphic females of *Periglischrus elongatus*. The male he describes is indistinguishable from typical males of *P. elongatus*. His female deutonymph appears to be the typical adult female of *P. elongatus*. His male deutonymph appears to be an adult male, and his protonymph, probably a male. I conclude that *Cameronieta* is a synonym of *Periglischrus*, and *C. thomasi* becomes *Periglischrus thomasi* (Machado-Allison). This has close relationship with *P. elongatus* Furman and *P. strandtmanni* Tibbets. If further research demonstrates that my hypothesis for existence of heteromorphic females in *P. elongatus* is correct, this species will become a synonym of *P. thomasi*.

In 1965 Machado-Allison (*Acta Biologica Venez.* 4, (11), pp. 259-288) refers to his paper in press describing 4 new species of *Periglischrus*. In his *Acta Biologica* paper (loc. cit.) he keys out the 4 species of *Periglischrus* referred to in his unpublished paper and includes rather inadequate photomicrographs. From these I conclude *P. tiptoni* Furman is a synonym of *P. acutisternus* Machado-Allison. *P. aitkeni* Furman is a synonym of *P. ojustii* Machado-Allison; the latter has erroneously described and photographed a teneral adult female of this species as a female deutonymph. *P. micronycteridis* Furman may be a synonym of *P. parvus* Machado-Allison. Both occur on *Micronycteris* species, but the photomicrographs and key characters given for *P. parvus* are inadequate for certain identification. I consider *P. setosus* Machado-Allison to be a synonym of *P. caligus* Kolenati. *P. inflatiseta* Furman is a synonym of *P. torrealbai* Machado-Allison. *P. squamosus* Machado-Allison is a synonym of *P. vargasi* Hoffman. *P. desmodi* Furman is a synonym of *P. herrerae* Machado-Allison.